COMPARATIVE MODELS OF THE IMPACT OF SOCIAL SUPPORT ON PSYCHOLOGICAL DISTRESS IN CANCER PATIENTS

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This study tested the relationship between Social Support, Psychological Distress, and Illness Stress in individuals who report cancer as a health condition. This study was based on archival data obtained from the Wave 1 of the Health and Retirement Study (HRS). The HRS provides a nationally representative sample of individuals aged 51 to 61 in 1992 and their spouses. The study sample was limited to cancer patients with a spouse or partner (n = 503).

A structural equation modeling analysis procedure was used to test the theoretical models. Measures of social support were limited to variables assessing the participant's satisfaction with social support. Evidence was found for the Stress Prevention and the Support Deterioration models. This is congruent with previous research using measures of social support perception. Both the Stress Prevention and the Support Deterioration models predict a negative relationship between Illness Stress and Social Support.

In addition, a univariate analysis of variance was used to test the stress buffering model. Similarly to other studies measuring the individual's degree of integration, or its perception, in the social network, the present research supported the only the Main Effect model and not the Stress Buffering model.

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CHAPTER I

INTRODUCTION

A Conceptual Approach to Social Support and its Application to Cancer

Definitions of Social Support have been as varied as the measures to evaluate it or the aspects of social support emphasized by authors. One example of a definition of social support is provided by Cobb (1976, p. 300). This author defines social support as “information leading individuals to believe that they are: cared for and loved, esteemed and a member of a network of mutual obligations.”

Rowland (1989) proposes five criteria for assessing social support: type of social support, source (provider), quantity and availability of support, quality of support, and perceived need for support. Type of social support refers to a taxonomy, which can be organized according to the functions fulfilled by social support.

Cohen and Wills (1985) describe two main types of social support: structural social support, which refers to the quantity of support received or perceived; and functional social support, which refers to the functions, or actions that providers perform when helping an individual. Cohen and Wills describe four main functions of social support: esteem, informational, social companionship, and instrumental social support. Social esteem and informational support are

probably directly effective in dealing with several kinds of stressful events, whereas social companionship and instrumental support seam to be more effective when matched with specific needs elicited by stressful events.

Rowland (1989) and Wortman (1984) identify as many as six types of social support. Informational support provides advice or information. Tangible support involves the provision of material aid. Emotional-affectional support is the expression of affect, including information about being loved and cared for. Affirmational support involved expressing the appropriateness of or the agreement with a person's feelings or beliefs. Affiliational support conveys information that the person is part of a social network of reciprocal help or mutual obligation. Finally, appraisal support gives feedback to the patient and encourages the open expression of feelings and beliefs.

According to Barrera (1986), social support is frequently defined in vague and overly broad terms. Barrera suggests that more precise social support categories, such as social embeddedness, perceived support, and enhanced support, should be used. Contrary to Rowland's (1989) and Wortman's (1994) typologies, which emphasizing the functions played by social support, Barrera's categories refer more to ways to measure social support.

Social embeddedness refers to social resources available to the individual (number of supporters and amount of social contact). This concept is comparable to Cohen and Wills' (1985) structural social support. Social embeddedness can be measured through social network analyses or using broad indicators such as

marital status, family structure, contact with friends, etc.. Perceived social support refers to the satisfaction with the support received and most measures include two dimensions: availability and adequacy of supportive relationships. Finally, enacted support refers to the frequency of specific helping behaviors or the actions that providers perform when helping the recipient. Enacted social support is similar to the notion of functional support, as proposed by Cohen and Wills (1985).

The impact of social support is not only affected by the types of support, but also by the sources or providers of that support (Rowland, 1989, and Wortman, 1984). For example, women with chronic illness (breast cancer, diabetes or fibrocystic breast disease) report receiving more affective support from friends than other sources, and more affirmation support from family (Primomo, Yates, & Woods, 1990). These women also perceive their partner as the major source of support in general. Another study (Dunkel-Shetter, 1981, referred by Wortman, 1984) shows that advice seems to be perceived as positive by cancer patients if provided by health professional but unhelpful if provided by friends and family.

Cancer support groups provide social support, in an alternative setting, to dealing with stressful events through family, friends and medical staff (Taylor, Falke, Shoptaw, & Lichtman, 1986). Moreover, several studies have shown the relationship between medical support groups and hard outcomes such as survival time. Spiegel, Bloom, Kraemer, and Gotthel (1989) report a study with 58

patients with metastatic breast cancer who were randomly assigned to a control group or an intervention group. The intervention group, which meet weekly for a 90-minute session, for one year, consisted of discussion of problems related to the terminal illness and ways to improve relationships. Results were surprising by showing that, ten years latter, there was an 18-month survival advantage associated with the intervention. These studies suggest the importance that social support has in adaptation to cancer issues. Cancer social support groups provide esteem, informational support, and social companionship. It may also help to develop better problem solving skills, which might result in an increased instrumental support.

Taylor, Falke, Shoptaw, and Lichtman (1986) compared the characteristics of cancer patients who attend and do not attend support groups. Participants were 667 individuals with different types of cancer and time since diagnosis ranged from newly diagnosed to 40 years after diagnosis. Results show that attenders are more likely to be recently diagnosed, female, white, and middle to upper-middle class individuals. This suggests that social support groups may be a redundant resource: the same population that seeks social support from support groups is also the population that is attracted by the other mental health resources. In addition, groups attenders tended to use more frequently social support resources of all kinds than non-attenders. Moreover, negative experiences with the medical community predict joining a group. Paradoxically, attenders reported having more concerns but no greater

psychological distress than non-attenders which might be explained by a response bias: patients who attend groups may tend to verbalize their concerns more. This study suggests that the assessment of the needs of patients underrepresented in social groups could help develop support group formats tailored more to particular types of patients.

The most common way to measure the quantity and availability of social support is the structural approach (Rowland, 1989). This involves asking individuals about the number of social relationships (marital status, involvement in social activities, amount of social contacts) and how satisfied they are with the support they receive (Rowland, 1989; Wortman, 1984). Rowland defends that the structural approach provides an objective and stable indicator of the individual's level of social activity.

An alternative way of measuring social support, suggested by Abbey et al. (1981, referred by Rowland, 1989 and Wortman, 1984), consists of asking about the supportive behaviors from "some one person" of the individual's choice. In other words, the individual is asked to think about one most salient person of their social network. When compared to other types of wording (such as "the person closest to you" or "the people in your life"), the phrasing "some one person" resulted in the strongest relationship between mental health outcomes and social support.

Wortman (1984) defends the advantages of conducting a social network analysis. This approach involves studying properties of the social network in

terms of size, density, accessibility, stability over time, and reciprocity. However, this approach is not common in the study of social support in the context of the cancer patient (Rowland, 1989; Wortman, 1984).

The quantity and availability of social support for cancer patients depend on a number of factors such as the individual's past resources, the impact of the disease (for example, level of physical impairment and in- or out-patient status), or the individual's ability to utilize the resources offered. Furthermore, internal factors of personality traits and coping styles may also affect how social support is viewed by the individual.

Schwarzer and Leppin (1991) present a structural model emphasizing the role of coping and stress appraisal in mediating social support and stress-induced pathology. Cognitive appraisal refers to an evaluation about why and under what circumstances certain situations are stressful (Lazarus & Folkman, 1984). Different types of appraisal serve different functions. Primary appraisal consists of the judgement about what and how much is at stake in a certain situation whereas secondary appraisal refers to the evaluation of coping options. The appraisal of a stressful situation depends on the perception of social embeddedness. For example, the perception of social support may imply the availability of a coping option, seeking help.

One of the proposed mechanisms to explain the influence of social support on health outcomes is that social support may change the coping mechanisms that are employed to deal with the stressful events (Waltman,

1984). In this way, social support may reduce repression/denial coping strategies which have a negative influence on immune parameters, even after controlling for medication use and health practices (Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Esterling, Antoni, Kumar, & Schneiderman, 1990).

Hobfoll and Walfisch (1984) report a study with 55 women interviewed prior to surgery for suspected cancer (acute stress phase) and three months after the surgery. This study only included women who were found not to have cancer. During the acute stress phase, both self-concept and social support were complexly related to psychological distress (anxiety and depression). This suggests that there might be an interaction between social support and personality variables (self-concept) and that both might play an important role as mediators between stress and psychological distress. Locus of control (in addition to social support) also seems to play a similar role in differentiating depression in women undergoing a breast biopsy (Grassi, Nappi & Molinari, 1987).

The quality of social support depends on whom you ask (Rowland, 1989). The recipient and the provider of social support frequently have a different perspective about the quality of support. Although Cohen and Wills (1985) defend that there is little evidence for a negative effect of social support on distress or symptomatology, Wortman (1985) refers to several studies indicating that behaviors intended to be supportive may be not perceived as such by the recipient or may be perceived as unhelpful.

Social support may have negative consequences when the providers of social support have misconceptions about how cancer patients should be treated or how patients should behave. For example, social support providers may believe that they should avoid discussing the patient's feelings about cancer. In addition, providers might believe that cancer patients should always be optimistic about the course of cancer. It has also been found that, especially when patients must depend on others for their activities of daily living, social support can emphasize the recipient's vulnerability and consequently decrease self-esteem (Rowland, 1989). Finally, cancer seems to be unique in its ability to elicit feelings in others. This might lead to feelings of vulnerability and discomfort when around the cancer patient. In fact, 52% of the cancer patients report feeling avoided or feared by others (Peter-Golden, 1982, referred by Rowland, 1989).

Although several studies report a negative effect of social support, a lower psychological adjustment might also be a consequence of a more debilitating physical condition of the patient and an increased need for social support, especially in times of acute stress. An example is provided by Revenson, Carol, Wollman, and Felton (1983), who report an exploratory study aiming at examining the effects of social support on patient's adjustment to illness. The sample included 32 non-hospitalized patients, who had been diagnosed with a hematological malignancy from 2 months to 8.5 years ago. Social support was measured through a structured interview in which the patient was asked how much of eight types of social support the patient received from family and friends.

According to Cohen and Wills (1985) this measure probably loads more on the functional aspect of social support.

The impact of social support in the Revenson et al. (1993) study depended on the treatment process and the patient's functional status. Social support was negatively correlated to adjustment. In other words, a higher social support was associated with negative mood, decreased perceptions of self-worth and mastery, acceptance of the patient role, and acceptance of death. However, this relationship was only significant for patients who where undergoing radiation therapy or chemotherapy, and for patients who had limited physical functioning.

Revenson, Carol, Wollman, and Felton (1983) interpreted these results by proposing that "receiving support while chronically impaired may have emotionally debilitating consequences" (p. 329). However, an alternative explanation could be that a high social support is mostly elicited in stressful times (Barrera, 1986). For cancer patients this may be associated with lower functional status, presence of chemotherapy or radiation therapy. The lower psychological adjustment could be a consequence of a more debilitating physical condition of the patient and not a consequence of a higher social support, as the authors suggests. This argument is also suggested by Wortman (1984). Further research is needed to differentiate these two explanations.

The quality of social support available also varies over time (Rowland, 1989). During diagnosis and the early treatment period, social support might buffer the impact of the disease on the sense of self by providing reassurance

that the patient is still loved and cared for. Later on, tangible aid might be important in facilitating adaptation by minimizing environmental stressors and by increasing a general sense of well-being. A study by Neuling and Winefield (1988) suggests that, when surgery destined breast cancer patients were adapting to the news that they had breast cancer and they were going to undergo surgery, satisfaction with support from family members (mostly emotional support) was an important factor for psychological adjustment (lower depression and lower anxiety). Latter on, when the patients received results about the biopsy and faced treatment decisions about adjuvant therapy, satisfaction with support from surgeons (mostly informational) became of prime importance for the patient's adjustment.

The last criterion for assessing social support is the perceived need for support. Since attempts to institute support interventions have an associated risk of being unhelpful if not perceived as a need, it is important to evaluate if there are deficits in a patient's support system and if these deficits are perceived as such (Rowland, 1989). According to Dunkel-Schetter (1984, referred by Rowland 1989), 95% of the interviewed cancer patients report receiving as mush assistance and understanding from the significant people in their lives as they needed. Neuling and Winefield (1988), in a study about social support and recovery after surgery for breast cancer, describe results showing that satisfaction with support varies with the source and the type of support. Empathetic support was required from all sources (family, friends, or surgeon)

and informational support was desired from surgeons and not from family and friends.

In conclusion, social support is a complex, multidimensional construct which is impacted and related to other important concepts such as personality and coping. As highlighted by Wortman (1984), cancer researchers face many issues in deciding how to conceptualize and measure the construct of social support. Both Wortman (1984) and Rowland (1989) suggest that, when measuring social support, close attention should be paid to the types of social support, the providers and recipients of social support, the quantity, quality and availability of support, and the perception of available, needed and received support.

The present study, limited by its archival nature, included measures of social embeddedness (structural social support) and perceived social support (according to Barrera's typology, 1986). Structural social support was measured by the following social network structure potential indicators: marital status, number of children living with participant, frequency of contact with children away from home, presence of relatives and good friends in neighborhood, frequency of contact with neighborhood friends and relatives, and number of hours spent in volunteer work. In addition, the study also included potential measures of satisfaction level with neighborhood, marriage, friendships, and family life and enjoyability of time spent with spouse. The satisfaction level with these sources probably constitutes a measure of perceived social support.

Models for Social Support and Distress

There seems to be no doubt about the positive relationship between social support, and health and well-being (Rowland, 1989). Although several authors propose different mechanisms to explain this relationship, little is known about the why and how social support influences health (Wortman, 1984). Though not interchangeable, health, well-being, and distress are related constructs in their relationships to social support and life stress. Distress can be conceptualized as the opposite of well-being, with well-being being usually related to psychosocial variables and health to medical variables. However, health can also be viewed as a broader term including mental and physical aspects.

In an important literature review provided by Cohen and Wills (1985), evidence is found for two possible mechanisms for the positive association between social support and well-being: the buffering model; and the main effect model. These two models seem to represent different processes through which well-being is affected by social support.

Evidence for both models is found depending on how social support is measured (Cohen & Wills, 1985). The buffering model is supported by studies assessing functional social support. Functional social support measures evaluate interpersonal resources that function in response to the needs elicited by stressful events. The main effect model is supported by studies assessing structural social support, or the person's degree of integration in a broad social network. However, Barrera (1989) defends that this distinction is not clear-cut

and that “support for the Stress Buffer model was not remarkably different for functional measures compared to structural measures” (p. 217).

The buffering model proposes that social support protects (“buffers”) people from the negative effects of stressful events. This model purports that social support is more strongly related to well-being for persons under greater stress, i.e., there is a significant statistical interaction between stress and social support (when taking level of symptomatology or distress as a dependent variable). This interaction can be described in the following way (Barrera, 1986, 1989, Figure 1). For low levels of stress, there is no significant difference between the impact of low or high levels of social support in the level of distress. For high levels of stress, low social support, when compared to high levels of support, is associated with a higher level of distress. Koopman, Hermanson, Diamond, Angell and Spiegel (1998) found evidence for the buffering hypothesis when analyzing the relationship between emotional adjustment (as measured by the POMS, McNair, Lorr, & Droppleman, 1971), number of people in the social network, and level of life stress in patients with advanced breast cancer.

Moreover, there is evidence for a pure buffering effect of social support (without the presence of a main effect), which suggests that certain support resources act only in the presence of high stress levels. However, this does not imply that the buffering effect only occurs in the presence of acute stress. The buffering effect of social support is present even when measures focus on chronic stress.

Evidence for the buffering model is found when the instrument evaluates social support functions that enhance broadly useful coping abilities. This is developed by Cutrona (1990) in her “optimal matching model of stress and social support.” According to this model, when stressors impair a wide range of life domains, as in the case of medical illness, needs associated with each of these domains will be created. In other words, the model predicts significant correlations “between [mental or physical health] outcome measures and the components of social support predicted to have maximal effectiveness given the life stress faced by the study participant” (Cutrona, 1990, p. 10). For example, the loss of an intimate relationship is matched with emotional support.

The main effect model proposes a significant main effect for social support, but no significant interaction (i.e., buffering effects) between stress and social support when taking level of symptomatology or distress as a dependent variable. Therefore, according to this model social support has a beneficial effect, decreasing the level of distress, regardless of whether people are under stress. Evidence of the main effect model is found when social support is evaluated by the degree of integration in a social network (Cohen & Wills, 1985). Even without involving improved means of coping with stressful events, social integration influences well-being by maintaining feelings of well-being regardless of stress level.

Aneshensel and Stone (1982) describe a study, with a large community sample, supporting the main effect model: the effects of stress on depressive

symptomatology did not differ for those with low and high levels of social support. Social support measures included an objective measure of the number of close relationships (structural support) and a measure of perceived social support. The measure of perceived social support included items measuring socio-emotional support and instrumental help.

Neither the main effect nor the buffering models explain how the social support buffers the deleterious effects of stress. Cohen and Wills (1985) suggest social support that may interfere with the perception the individual has of the stressful event by providing information about the situation or about the resources to cope with it. These authors also propose an alternative explanation, in which support reduces the stress reaction through different mechanisms, including facilitating health behaviors, providing a solution to the problem, or reducing the perceived importance of the stressor. Another possible way social support reduces the stress reaction is by altering people's mood. Enhanced mood can alter neuroendocrine pathways and facilitate constructive coping (Wortman, 1984). Table 1 presents a summary of ways in which support may buffer the deleterious effects of stress, as proposed by Wortman (1984).

In a literature review about social support concepts, Barrera (1986) presents six models depicting possible relationships between social support, stress, and distress. Table 2 present a summary the six models and respective characteristics. Similarly to Cohen and Will (1985), Barrera defends that "certain social support concepts fit some models better than others" (p. 438).

The effective support mobilization model predicts a positive relationship between social support and stress. According to this model, stress is positively related to social support, which, in turn, predicts a decrease in distress. In other words, stress triggers mobilization of social support and social support acts to suppress the effects of stress. This model specifies a possible mechanism for the buffering model. A second mechanism predicts that social support interacts with stress, but support is not independently related to either stress or distress.

Most studies supporting the effective support mobilization have used an enacted social support measure (Barrera, 1986). This is congruent with Cohen and Wills (1985) who suggest that the buffering model be mainly supported by studies using functional social support measures. However, some studies using a social embeddedness measure also support this model.

Barrera (1989) proposes a “model of curvilinear stress buffering effects,” in which high and low social support is associated to comparable distress levels at extremely low- and extremely high-levels of stress (Figure 2). For low levels of stress, this model is similar to the classical buffer model. For moderate levels of stress, the model is consistent with main effects of support. Finally, for high levels of stress the model represents negative buffering effects, in which the curve for high social support has a steeper slope than the curve for low levels of social support.

Most studies analyzing the relationships between stress, social support, and distress do not include participants who have been subjected to a wide

range of different levels of stress. This factor has probably resulted in a lack of more empirical evidence for the model of curvilinear stress buffering effects. The present study focused on data collected from a wide sample of participants who have or have had cancer and who vary in their health status. For example, a patient recently diagnosed with cancer, who is undergoing chemotherapy and who reports high levels of pain is considered to be experiencing less stress than a patient who has been free from cancer for the past 10 years and who reports having good health. This will assure a wide range of stress levels, necessary to test the model of curvilinear stress buffering effects.

The stress prevention model predicts a negative correlation between social support and stress. Specifically, social support prevents the occurrence of stressful situations or reduces its perceived threat. Therefore, social support is negatively associated to stressful events, which, in turn, predict distress. This model is supported by studies using perceived social support measures or using mixed measures that also include perceived social support items. A study by Lin, Dean, and Walter (1986), using structured equation modeling, provides evidence that occurrence of stressful events is prevented by social support. In this study the latent social support construct consisted of several indicators such as instrumental support and network structure.

Both the support deterioration model and the support seeking/triage model predict a positive relationship between social support and distress. The former model is supported by studies using perceived (or mixed) social support

measures whereas the latter is supported by enacted (or mixed) social support measures. According to the support deterioration model, stress deteriorates the availability or effectiveness of social support. Here, stressful events are positively correlated to distress. In addition, stress predicts decreased social support which, in turn, is negatively related to distress.

Several types of stressors could lead to a diminution of social support in the support deterioration model (Barrera, 1989). First, some stressful events, such as the death of a spouse, are social exit events that change the network structure. Second, the individual who is experiencing the stressful event might experience social avoidance. For example, approaching a cancer patient might generate anxiety about illness and death issues. Finally, some individuals might isolate themselves and choose to face a stressful situation without the added strain of comparison to others who are not facing the same situation.

The support seeking/triage model predicts that individuals with greater distress will seek or receive more social support. According to this model, stress is positively related both to social support and to distress; distress then predicts an increase in social support. A variation of this model depicts a spurious positive relationship between distress and social support that results from the positive relationships of stress to both variables.

The additive model predicts that changes in stress and social support make independent contributions to changes in distress. Consequently, stress is positively related to distress whereas social support is negatively associated to

distress. This model is mostly supported by studies using social embeddedness measures. Similarly, Cohen and Wills (1985) defended that the main effect model is mainly supported by studies using structural support measures (structural support is a comparable construct to social embeddedness).

Similarly to the addictive model, the reciprocity model also predicts a negative correlation between social support and distress. Both models are mainly supported by studies using perceived social support measures. In addition, some studies using social enbeddedness and enacted social support measures also support the addictive model and the reciprocity models. The reciprocity model predicts a two-way reciprocal relationship negative between stress and social support. Furthermore, social support is negatively related to distress and stressful events predict an increase in distress.

Using structural equation modeling, Komproe, Rijken, Ros, Winnubst, and Hart (1997) provide an excellent example of how social support models have been tested in cancer related stressors. The authors assessed path models describing the direct and indirect effects of available and received support on depression (as assessed by the CES-D, Radloff, 1977) in 109 women recently diagnosed with breast cancer. Results showed that received support has indirect effects on depression by its effect on coping and appraisal. More specifically, received support is positively associated with coping which, in turn, is negatively related to depression. In addition, received support is positively associated to depression. This finding might be explained by the support seeking/triage model

which predicts that individuals experiencing a greater distress seek/receive the most support. Finally, a negative relationship between available support and depression was found, which can be interpreted as an evidence for the main effect model. The authors conclude that buffering effects are created by both available and received support. Furthermore, main effects are created when available support is involved.

Another study with breast cancer patients also provides support for the support seeking/triage model. Neuling and Winefield (1988) report a study with 58 patients undergoing surgery for breast cancer. A greater amount of support received from friends prior to surgery was correlated with higher levels of anxiety, and depression. Similarly, greater support from friends received during the month after surgery was correlated with higher number physical problems and a higher level of anxiety.

The present study included measures of structural social support. Although the participants were asked several questions about the amount (social embeddedness or structural social support) and satisfaction (perceived support) of contacts with different network members, nothing is known about what kind of help these members provided (enacted support). According to Cohen and Wills (1985), measures of structural support should support the main effect model, not the buffering model. However, Barrera (1986, 1989) defends that this distinction is not so clear and that it is possible to find buffering effects with other measures besides enacted (or functional) social support. According to Barrera (1986) some

studies using social embeddedness measures also support the buffering model or support mobilization model. In addition, the wide range of stress level will possible allow to test for the model of curvilinear stress buffering effects (Barrera, 1989).

Many are the possible relationships between the measured Social Support constructs (social embeddedness or structural social support, and perceived support), Stress, and Distress. This study aims at testing these possible relationships through structural equation modeling procedures.

Psychoneuroimmunology as a Mechanism for Social Support and Distress

A possible mediator of stress and social support on medical outcome is support-induced changes in immune function, as suggested by psychoneuroimmunology studies (Cohen & Herbert, 1996; O'Leary, 1990). Speigel, Sephton, Terr and Stites (1998) also propose that neuroimmune pathways may mediate the effects of psychosocial treatment in prolonging cancer survival. Perceived availability of social support and different types of social support seems to be associated with positive indicator of immune function, independently of psychological distress, health practices, depression, and number of stressful life events. In contrast, loneliness and social disruption appear to be associated with impaired immune functioning (O'Leary, 1990).

The presence of social support reduces mortality risk from cancer. Three randomized, prospective studies found that patients given psychosocial treatment, as compared to controls, had longer survival times (Spiegel, Spheton,

Terr, & Stites, 1998). These studies suggest that psychosocial treatments may improve medical outcome by buffering the biological effects of illness associated stress and thus improving immune function.

The relationship between social support and immunocompetence parameters might be mediated by several other constructs, such as depression and stressful life events. For depression, both clinical depression (Herbert & Cohen, 1993a) and depressed mood (Cohen & Herbert, 1996) are related to lower immune parameters than in healthy controls. This association is still observable even when statistically controlling for health practices (Irwin et al., 1987, 1990; Schleifer et al., 1990; referred by Cohen & Herbert, 1996). A relationship between stressful life events and immunity is well known and documented (for example, Cohen & Herbert, 1990). Alternatively, social support might be only beneficial to the extent that it lowers the number of negative life events encountered and thus lower the distress response to experiencing fewer life stressors.

In a study by Baron, Cutrona, Hicklin, Russell and Lubarof (1990), with 23 spouses of urology cancer patients, social support, as measured by the Social Provisions Scale (Cutrona & Russell, 1984) was associated with greater immunocompetence on two of three measures. Two possible mediating mechanisms were explored: depression (measured by the Beck Depression Inventory) and incidence of major life events beyond the spouse's illness, measured by the Geriatric Social Readjustment Rating Scale (Amster & Krauss,

1974, referred by Baron et al.). Nevertheless, no evidence was found for mediation by either depression or stressful life events in the study by Baron et al..

Although the relationship between immune function and tumor growth is still equivocal, one of the immune mechanisms that play an important role in combating tumor growth is related to NK cell activity (Spiegel, Sphton, Terr, & Stites, 1998). NK cells have been shown to kill tumor cells when tested in vitro. In addition, reductions in immune measures, including NK measures, have been shown to be associated chronic stress, such as being or having been the caregiver of an Alzheimer's patient, (Esterling, Kiecolt-Glaser, Bodnar, & Glaser, 1994) and to interpersonal stressful events such as separation and divorce. This is particularly important taking into consideration that the diagnosis and illness process of most types of cancer can be considered a chronic stressor.

NK cell activity is known to vary with psychosocial factors: NK activity is negatively reactive to life stress events and positively associated to social support (Spiegel, Sphton, Terr, & Stites, 1998). Using step-wise multiple regression analyses, Levy, Herberman, Whiteside, Sanzo, Lee and Kirkwood (1990) found that social support is associated with increased NK activity in breast cancer patients. In fact, the perception of the quality of emotional support received from significant others was the most important predictor of NK cell activity. Similar results had also been found in a previous study (Levy, Herberman, Lippman, & d'Angelo, 1987).

In addition, NK cell response to cytokines differed according to the level of social support as reported by caregivers of Alzheimer patient (Esterling, Kiecolt-Glaser, Bodnar, & Glaser, 1994). Participants who reported less positive emotional and tangible social support and less closeness in their relationships showed a lower NK cell activity, but no difference was found on NK cell activity for upsetting emotional and tangible supports or for number of people in their network .

There are no studies that show that disease progression is affected by modulation of stress. However, perceived social support and seeking social support have been associated with both increased NK activity and increased survival time (Spiegel, Sphton, Terr, & Stites, 1998). In addition, Ell, Nishimoto, Mediansky, Mantell, and Hamovitch (1992) showed that emotional support is a significant protective factor predicting survival in breast cancer or with localized cancers (but not for patients with lung or colorectal cancers or with non-localized cancers).

An important example of a study analyzing the relationship between social support interventions and immune function in cancer patients is provided by Fawzy et al., (1993). These authors describe a six-session group intervention, including stress-management training and education about cancer, provided to melanoma patients. Results showed decreased psychological distress and increased NK activity six months after the intervention.

Several factors complicate the study of the relationship between immune and psychological factors in cancer patients (Cohen & Herbert, 1996). First, cancer includes a large and heterogeneous set of diseases. Second, the role of psychological and immune processes may vary according to the stage of cancer. Third, the contribution of psychological variables is overshadowed by biological factors. Despite the need for further research, Cohen and Herbert, in this review of several studies, conclude that better prognostic indicators are associated with greater access to social support in cancer patients. This effect is larger for women than for men and for younger than older women. Furthermore, depression in cancer patients is associated with disease progression and shorter survival.

The current study investigated the relationships between Social Support, Stress and Psychological Distress. Neuro-immune mediation seems to be a plausible mechanism in explaining the relationship between these three concepts in cancer patients. However, most of the studies including these measures have a relatively small number of participants. The current research uses a subsample of individuals who reported cancer as a health condition in a study using a large nationally representative sample of individuals interviewed in 1992 about health and retirement issues (HRS study). Neuro-immune measures were not included in the study. To study neuro-immune variables as mediators between Stress, Distress, and Social Support would certainly have been very costly in such a large sample as the one used in the HRS study.

Stressors in Cancer and Post-Cancer

The diagnosis of cancer is considered a stressful life event usually associated with threatened actual loss. Herbert and Cohen (1993b), in a meta-analytic review of stress and immunity in humans, conclude that greater (negative) immune alterations are related to events that are objective (as opposed to subjective self-report of stress), of long duration, and related to interpersonal incidents. The diagnosis of cancer meets all these three characteristics. The diagnosis of cancer is an objective event, which occurs in a specific point in time, when the physician communicates the diagnosis to the patient. Cancer usually involves a long treatment and it is often considered a chronic disease (Spiegel, Sephton, Terr, & Stites, 1998). The diagnosis of cancer and its treatment almost always has profound interpersonal consequences (for example, by disrupting social roles and functioning).

Although the clinical course for cancer can be as diverse as the types of cancer, there are as some commonalties (Holland, 1989). The phase from the first symptoms to the actual diagnosis is usually lived with a great degree of anxiety and fear. Indeed, some patients choose to carry this burden by themselves, avoiding worrying the family members. Diagnostic tests usually include several invasive and physically uncomfortable techniques such as computerized scans, blood tests, biopsies, and bone marrow aspirations.

After diagnosis, the patient undergoes the primary treatment, most frequently radiation therapy, chemotherapy, surgery, or a combination of these.

Although the goal is cure and the patient is usually optimistic and willing to tolerate whatever is necessary, difficulties emerge from coping with treatment side effects. These include, among others, nausea, fatigue, and changes in body image. In case of successful treatment, the next phase is rehabilitation. Here, the patient faces fears of going home and reassuming independence, as well as anxiety about returning to work and social responsibilities. Frequently, the patient needs to cope with adaptation to side effects or sequelae of treatments, reactive anxiety or depression, and uncertainty of future and fears of recurrence (McQuellon, Russell, Rambo, Craven, Radford, Perry, Cruz, & Hurd, 1998).

For some patients relapse is viewed as the end of uncertainty. In fact, patients who were more surprised by the recurrence of the disease show higher levels of distress (Weisman & Worden, 1986 as referred by Holland, 1989). Recurrence is also a period of intensified existential concerns, sadness and depression. In the absence of a positive response to the treatments, the patient and the treatment team face the choice between hospice and participation in investigative therapy. When no treatment is possible, then the focus is on improving quality of life, as opposed to prolonging life.

With the advancement of medical technology, both morbidity and mortality of cancer have decreased considerably. As opposed to early in the century, when the five-year cancer survival was less than 10%, the current five-year survival rate for all sites of cancer combined is greater than 50% (Tross & Holland, 1989).

Even after the disease has been classified as “in complete remission,” cancer survivors face problems (List, Mumby, Haraf, Siston, Mick, MacCracken, & Vokes, 1997; Polinski, 1994). Revenson, Carol, Wollman, and Felton (1983) report an exploratory study in which patients were asked about their perception of the illness-related stressors. All 32 participants, aged 50 to 83 years, were patients who had been diagnosed with hematological malignancies. Time since diagnose ranged from 2 months to 8.5 years. Half of the sample reported stresses related to anxiety and fears surrounding disability, uncertainty in the future, and possible death. The second most common reported stressor was treatment and disease-related symptoms. In addition, patients also referred limitations on mobility and activity, problems with social relationships, treatment demands, pain, emotional reactions, and complaints about health care.

Later medical effects of treatment include increased risk for recurrence of the cancer, developing a second cancer, and death (Tross & Holland, 1989). Patients are also at an increased risk for cardiovascular problems (especially as a later medical effect of treatment for childhood cancer), low stamina and energy level (especially after treatment for leukemia and lymphoma), and anxiety and nausea (mainly after cyclic chemotherapy). Some of these effects persist for a long time after diagnosis and treatment. For example, risk for a secondary malignancy in childhood cancer survivors peaks in the period between 15 and 19 years (Li et al., 1978, referred by Tross & Holland, 1989) and some patients

report nausea even 12 years after completion of chemotherapy (Cella et al., 1986, referred by Tross & Holland, 1989).

Sexual complications are most common in the following cancers: breast, cervical, testicular, prostatic, colorectal, leukemia, and Hodgkin's disease (Tross & Holland, 1989). Frequent complaint are: decreased libido and marked mood changes; azoospermia, germinal aplasia (two conditions that cause a low sperm count) and erectile dysfunctions for men; and menstrual irregularity for women.

Neurophyschological late effects have been observed in children treated for brain tumors or for acute lymphoblastic leukemia. These effects include decline in intellectual ability (especially severe for brain tumors), deficits in attention and concentration, and school achievement problems (Toss & Holland, 1989). Furthermore, cancer or its treatment can cause neurological damage even in the absence of direct invasion of the nervous system. This is especially true for systemic cancers (Patchell & Posner, 1989).

Psychological sequelae in cancer survivors are associated with a residual response to diagnosis and treatment and an anticipatory response to the threat of death. Patients often express anxiety and depression, increased sense of vulnerability and decreased senses of control and personal adequacy, and fear of social rejection (Tross & Holland, 1989). Nevertheless, cancer can also result in an increased marital adjustment. Gritz, Wellisch, Siau and Wang (1990) interviewed 34 long-term survivors of testicular cancer and their wives four years after the end of treatments. All couples except four reported a bonding effect and

suggest the importance of spouse supportiveness and couple communication to good adjustment to cancer.

Finally, cancer survivors face re-entry and job insurance problems (Tross & Holland, 1989). The transition from “patient” to “healthy“ status may be hindered an increased sense of personal vulnerability. Rejection sensitivity and social withdrawal may also damage interpersonal relationships. In addition, the patient may also face financial difficulties, job insecurity, and health and life insurance discrimination.

Psychological and physiological consequences of chronic stress might persist for long periods even after the cessation of the actual stressor. A study with family caregivers of Alzheimer’s disease patients showed that the effects of chronic stress continued for over two years after the death of the Alzheimer’s disease patient. Caregivers showed more depressive symptoms, higher perceived stress, and poorer NK cell response of to cytokines when compared to control participants (Esterling, Kiecolt-Glaser, Bodnar, & Glaser, 1994).

The present study investigated the relationships between Stress, Distress and Social Support in cancer patients. The diagnosis of cancer, its treatment and medical and psychological late effects can be considered as a major life chronic stressful event. Measures of stress, used in the present study, were limited to illness issues. More specifically, available chronic stress measures included the following indicators: subjective appraisal of quality of life, severity of cancer (measured in survival rate associated to the location of cancer), number of health

conditions besides cancer (up to six specific health conditions), severity of usual and worst pain, activities of daily living, and number of days spent sick at home during the past 12 months.

Depression in Cancer and Post-Cancer Patients

The diagnosis of cancer is most often considered as a negative life event that is associated with threatened loss. In fact, oncological diseases are frequently chronic, painful, incapacitating, and probably leading to loss of attractiveness or death. Emotional reactions of cancer patients do not differ significantly from reactions of individuals to other catastrophic events (Massie & Holland, 1989b).

Adjustment disorder with depressed and/or anxious mood is the most common emotional disturbance seen in cancer patients. Variable moods are expected in adaptation to illness, especially during crisis points of the illness. However, variable moods normally do not have an adverse effect on medical outcome. It is the clinician's role to differentiate psychological responses that are normal from incapacitating and intolerable psychological symptoms that may impair the patient's ability to tolerate illness and treatment. Mood disorders may interfere with patients' quality of life, their ability to make appropriate treatment decisions and to adhere to treatments and therefore may have an effect on survival.

According to Bukberg, Penman, and Holland (1984), reported rates of depressive states vary from 25% to 50% for cancer patients. Massie and Holland

(1989) present data which suggests that among hospitalized patients with significant levels of physical impairment, at least 25% are likely to meet criteria for major depression or adjustment disorder with depressed mood. Bukberg et al. (1984) assessed oncology patients using a clinical interview, the Hamilton Rating Scale and the Beck Depression Inventory. Of the 62 patients interviewed, 44% had no depressive symptoms, 14% had some depressive symptoms but did not meet criteria for a depressive syndrome, 18% were judged moderately depressed and 24% severely depressed. Nevertheless, data suggest that cancer patients are no more depressed than equally physically ill patients with other diseases (Massie, 1989a; Massie & Holland, 1984, 1990a).

Bukberg et al. (1984) also suggest that depression in oncology inpatients is quantitatively different from that seen in psychiatry inpatients. Suicidal ideation, guilty ruminations, psychotic depressive symptoms and profound feelings of worthlessness seem to be more common in severely depressed psychiatric patients than in the oncological population. Moreover, somatic symptoms did not distinguish the depressed from the non-depressed patients. Plum and Holland (1981, referred by Bukberg et al., 1984) found that although somatic symptoms did not differentiate psychiatric patients with recent suicide attempts from cancer patients, symptoms such as sense of guilt, failure, and self-dislike did.

The diagnosis of depression in physically healthy psychiatric patients depends on depressive symptoms such as insomnia, fatigue, anorexia, and weight loss (Aylard, Goodeng, McKeena, & Smith, 1987; Massie & Holland,

1984; Snaith, 1987). However, these symptoms are also likely to be direct effects of a physical illness in medically ill patients. Masse and Holland (1984) content that the diagnosis of depression in cancer patients must rely in psychological features such as dysphoric mood, loss of self-esteem, and feelings of helplessness. According to Snaith (1987), anhedonia is the key symptom that remains as a possible distinctive feature indicating the presence of depression in medically ill patients. McDaniel, Musselman, Porter, Reed, and Nemerff (1995) suggest the use of well-established biological markers as adjusts in establishing diagnosis of depression in cancer patients.

Social support seems to play an important function as a buffer for depression in cancer patients. Godding, McAnulty, Wittrock, Britt, and Khansur (1995) studied 69 male cancer patients (mean age: 64 ± 8.7 years) whose cancer diagnosis had been made within the past six weeks. The study identified predictors of depression, as measured by the Beck Depression Inventory. The two predictive measures used were the Quality of Life Index, (Padilla, Presant, Grant, Metter, Lipsett, & Heide, 1983) and Social Provisions Scale (Cutrona & Russell, 1984). In recently diagnosed older male cancer patients, lower quality of life and less social support account for 31.5% of the total variance in predicting depression scores. In addition, lower quality of life accounted for 13.5% of the variance in depression above and beyond lower social support.

Both structural and perceived social support seem to be associated with lower depression in cancer patients. Vernon, Gritz, Peterson, Amos, Pertz, Baile,

and Lynch (1997) found that, colorectal cancer patients undergoing genetic testing, higher depression (as measured by the CES-D, Radloff, 1977) was associated with fewer social contacts and less satisfaction with them.

Depression was considered as an outcome measure of Psychological Distress in cancer patients in the present study. Three indicators were used: the presence of psychiatric problems, the score on the Center for Epidemiological Studies – Depression Scale (CES-D, Radloff, 1977), and the self-rated emotional health score. The CES-D is a well validated measure that tends to minimize the confound of depressive symptoms created by somatic effects of cancer and psychological aspects of depressive symptoms (Gritz, Wellich, Siau, & Wang, 1990)

The Present Study

As Wortman suggests, “it is time to move from beyond demonstrations between support and health outcomes to a more careful explanation of the processes underlying support” (Wortman, 1984, p. 2356). The present study tested the following competing models of the relationships between Social Support and Psychological Distress in cancer patients: the effective support mobilization model (buffering model); the stress-prevention model; the support deterioration model; the support seeking/triage model; the additive model (main effects model); and the reciprocity model.

A structural equation modeling approach was used to test the models proposed by Barrera (1986) explaining the relationships between Illness Stress,

Psychological Distress and Social Support. This study allowed the analysis of these models in a very specific population: married individuals who report cancer as a health condition. Although many studies demonstrate the relationships between Social Support and Psychological Distress in cancer patients, only a few attempt to a more conceptual view and to explain the mechanisms involved in such a relationship and test competing models.

In this study, Social Support was operationalized through several structural and perceived support indicators; Illness Stress was operationalized through several physical health indicators, and Psychological Distress was measured through depression symptoms (as measured by the CES-D), the presence of psychiatric problems and self-rated emotional health.

The sample for this study is drawn from the Health and Retirement Study (HRS), a study of a nationally representative sample of 12,600 individuals who, in 1992, were aged 51 to 61 and who were near retirement. According to Wallace and Herzog (1995), 6% of the HRS respondents reported cancer as a medical condition.

The age of these participants may also raise an added stressor: stress from having or having had cancer may also be aggravated with aging and retirement issues. According to Cobb (1976), social support plays an important functioning in protecting people from the consequences of the stress of growing old.

Early studies have found that being married, being employed or participating in social activities are protective agents against depression (Blau, 1973; Lowenthal & Haven, 1968, as referred by Cobb, 1976). Consistent with these findings, social isolation and chronic health conditions, among other variables, were predictors of depression one year latter in a panel study of community residents of 50-years old and older (Roberts, Kaplan, Shema, & Strawbridge, 1997). However, this study showed that healthy, normal functioning older individuals are at no greater risk for depression than younger adults. Another study (Hughes, DeMallie, & Blazer, 1993) showed that health problems and impaired social support were predictors of depression (measured by the CES-D) for patients younger patients (less than 60 years old), but not for older patients.

In sum, this study will contribute to a better understanding of the underlying mechanisms through which Social Support may influence health outcomes. This may be critical on the development of effective interventions to promote support (Wortman, 1984).

The diagnosis of cancer, its treatment and medical and psychological late effects can be considered as a major life chronic stressful event. Measures of Life Stress, used in the present study, were limited to Illness Stress issues. More specifically, available chronic stress measures include the following indicators: subjective appraisal of quality of life, number of health conditions besides cancer

(up to six specific health conditions), severity of usual and worst pain, number of days spent sick at home, and functional status (activities of daily living).

CHAPTER II

METHOD

This study tested competing models of the relationship between Social Support, Illness Stress, and Psychological Distress for married cancer patients. The study was based on archival data, from the Wave 1 (data collected in 1992) of the Health and Retirement Study, HRS (Juster & Suzman, 1995).

Participants

HRS sample. The HRS is a longitudinal survey designed to understand the interaction of economic status, behavior, and health in determining individual transitions from employment to retirement. The National Institute on Aging and the Institute for Social Research of the University of Michigan support this study. Although the HRS comprises three waves (1992, 1994 and 1996), the present study only focused on data from the baseline or Wave 1 (1992).

The study comprises a nationally representative interview sample of 7,600 household individuals born between 1931 and 1941 (about 12,600 interviews total). Each household had a participant whose age was 51-61 at baseline (1992). The study included an over-sample (100%) of Hispanics, African American, and Florida residents.

Table 3 presents the gender and race distributions for the total HRS Wave 1 sample. There were more twice as many women as men in households in

which the age-eligible person was non-married. For this reason, the overall sample has slightly more women (53.6%) than men (46.4%). The distribution by job status is as follows: 63% working; 12% retired; 9% disabled; 15% homemakers (Juster & Suzman, 1995). Relative to age, 149 wives and 16 husbands of age-eligible respondents were 40 years old or younger, in 1992, the time of Wave 1 (Soldo & Hill, 1995).

According to Wallace and Herzog (1995), 6% of the HRS respondents reported cancer (cancer or malignant tumor except skin cancer) as a current or past medical condition. The percentage of the participants who reported cancer as a severe form (defined as having been treated for the cancer during the last 12 months) was 2%.

Study subsample. Only a subsample of the HRS Wave 1 participants was included in the current analyses. The sample size was reduced to the married (or living with a partner) participants that reported cancer as a present or past health condition (n = 514). Several reasons, related to the construct of Social Support, support this decision of only using participants with a spouse/partner. First, the presence of a spouse/partner is usually considered an important factor of the social support network. This study includes three observed variables that are impacted by the presence of a spouse/partner: Satisfaction with Marriage, Satisfaction with Family Life, and Time Spent with Spouse. Second, the social support network is probably very different for cancer patients with and without a

spouse. Third, individuals with and without a spouse/partner might also differ in the way they perceive and define Social Support.

This subsample (cancer patients with a spouse/partner) has more women (n = 340, 66.15%) than men. The vast majority of the participants were Caucasians (n = 443, 86.19%), with only 10.31% (n = 53) of the participants being African American. The distribution of males and females did not differ by race (Caucasian vs. other). Most of the female participants reported having either female genital (n = 130, 38.35%) or breast (n = 118, 34.81%) as their most recent cancer. The most frequent cancers for male participants in these analyses were male genital (including prostate, n = 31, 18.67%), urinary (n = 29, 17.47%), digestive (n = 22, 13.25%), oral (n = 21, 12.65%), and respiratory (n = 20, 12.05%). As shown also in Table 4, cancers in women were more localized in type of cancers in men.

Female cancer participants are significantly younger (M = 54.44 years, SD = 5.44) than males (M = 59.95, SD = 5.77). This difference is not only statistically significant [t(512) = 10.52, p < .0001], but also of a relatively large magnitude (effect size eta = .42). The education level (number of years) and the number of people in the household did not differ by gender. Table 5 presents the means and standard deviations by gender.

Materials

The survey for the HRS Wave 1 study consists of two parts: the core survey (included in all household interviews) and 10 experimental modules

(Juster & Suzman, 1995). The core survey consists of 14 sections (Table 6). The experimental modules were only answered by a limited number of participants (between 500 and 800 for most modules). This study will only use information from the following core survey sections (Appendix C): Demographics, Physical Health and Functioning, and Family Structure and Transfers. The Demographics section provides information about marital status, an important indicator of structural Social Support. Information about Psychological Distress and Illness Stress indicators in found on the section concerning physical health and functioning. Most of the information about Social Support, besides marital status, is found in the section about family structure and transfers (Table 7).

Information about the Illness Stress and the Psychological Distress measures used in the present study was based in an important overview of the health measures in the HRS Wave 1 provided by Juster and Suzman (1995). Soldo and Hill (1995) report an overview of the measures included in the Family Structure and Transfers section. However, Soldo and Hill's overview focuses on transfers and no information is provided about the Social Support variables used in the present study.

Social Support measures. The archival nature of this study imposed a constraint in the selection of the indicators for the psychological constructs. Therefore, Social Support was not measured using a formal and validated social support scale. Instead, Social Support was constructed using several indicators from the section concerning family structure and transfers including: satisfaction

level with neighborhood, marriage, friendships, and family life and enjoyability of time spent with spouse (Table 7).

In addition, several variables could be used as potential indicator of the structural aspect of social support. These include: marital status, number of children living with participant, frequency of contact with children away from home, presence of relatives and good friends in neighborhood, frequency of contact with neighborhood friends and relatives, and number of hours spent in volunteer work.

In case of a married partners household, most of the Family Structure and Transfers section was only answered by the female respondent. Along with other problems that impact these potential Social Support indicators, being answered by only the female member of two-person household caused some variables from the Family Structure and Transfers section to be discarded. However, all participants answered the questions about level of satisfaction with several social support sources.

Illness Stress measures. Illness Stress was measured using eight indicators (Table 7), including subjective appraisal of quality of life, pain, activities of daily living, number of health conditions, number of days spent sick at home (past year) and information about the cancer condition (including bodily location, time since diagnosis, and if the participant saw the doctor during the past year). Information about the survival rate by body location of cancer was used to determine the severity of cancer (Ries, Kosary, Hankey, Miller, & Edwards,

1998). All these variables were measured in the survey section Physical Health and Functioning (Appendix C), which was asked to both people in the couple households (Juster & Suzman, 1995).

The measure of subjective appraisal of quality of life comprises two items, one asking how respondents rate their health (from 1 = “excellent” to 5 = “poor,” on a five-point Likert-type scale) and the other comparing present health to one year ago (rated from 1 = “much better” to 5 = “much worse,” on a five point Likert-type scale). These questions were designed “to capture respondent’s subjective summary interpretations of their own medical and functional status” (Juster & Suzman, 1995, p. S98) and significantly correlate with measures of pain and depression. The average of these two items was used as an indicator of participants’ quality of life.

Functional status was assessed with 21 items assessing not only basic activities of daily living (ADL), but also more physically or cognitively demanding tasks. Each item was rated on a four-point Likert-type rating scale, ranging from 1 = “not at all difficult” to 4 = “very difficult/can’t do.” An exploratory factor analysis revealed three factors: Mobility Difficulty, Large Muscle Difficulty, and ADL Difficulty. As expected, factor-based indices (count of items in each factor with which the respondent reported any difficulty) are related to health measures of disease in a meaningful way, where disease was associated with more functional problems (Wallace & Herzog, 1995). The overall ADL score (average of the 21 ADL items) was used as an indicator of participants’ functional status.

The number of health conditions besides cancer (up to six specific health conditions) refers to a simple count of other specific health conditions reported by the respondent. These included: high blood pressure, diabetes, chronic lung disease, heart condition (and associated health consequences), stroke (and associated health consequences), and arthritis. Each of these six conditions was rated as “severe” or “non-severe” based on specific follow-up questions for each condition. The presence of these health conditions was associated with indicators of worse health, such as pain, mobility impairment and physical dysfunction (Juster & Suzman, 1995).

In case participants reported being often troubled with pain, the severity of usual and worst pain is assessed through two items, rated on a three-point Likert-type scale (from 1 = “mild” to 3 = “severe”). Both measures of usual and worst pain have been found to differentiate patients (Wallace & Herzog, 1995). Patients with no cancer report a significantly lower level of usual pain ($\underline{m}$ = .39) than patients who have non-active cancer ($\underline{m}$ = .55, $\underline{p} < .01$). In addition, patients with no cancer report a significantly lower level of worst pain ($\underline{m}$ = .57), than patients with non-active cancer ($\underline{m}$ = .67, $\underline{p} < .01$). These two pain measures are also strongly associated with measures of subjective appraisal of quality of life (Wallace & Herzog, 1995). The average of these two pain variables was used as an indicator of participants’ pain level.

The number of days sick at home (last 12 months) measured severity of health condition. The greatest number of sick days was associated with patients who report a stroke or other severe health condition (Juster & Suzman, 1995).

Several questions provide information about the severity of cancer. First, the respondent was asked how many cancers he or she has had (number of cancers). Next, the respondent was asked several questions about the two most recent cancers, including: year of diagnosis, part of body, if he or she saw a doctor for the cancer in the past 12 months. Only information about the most recent cancer was used in these analyses. The body location of the cancer provides an indication of the cancer severity. Patients with active cancer (defined as having had cancer treatment in the past 12 months) reported significantly greater depression (measured by the CES-D) than those with no cancer. No significant difference was found between the level of depression of patients with no cancer and patients with non-active cancer (Juster & Suzman, 1995).

Psychological Distress measures. Psychological distress was measured using three indicators (Table 7). The first one is a depression score (questions B44 to B44m, in Appendix C), obtained through the Center for Epidemiological Studies Depression (CES-D) Scale (Radloff, 1977). The second is the self-rated emotional health (question B3 in Appendix C). The third indicator is self-reported presence of psychiatric problems (questions B23 to B24b, in Appendix C). Wallace and Herzog (1995) provide an excellent overview of the health measures in the HRS Wave 1 study, based on a sample of 9,300 respondents,

including spouses of primary respondents. The following information was based on their report.

Depression was measured using a short version of the Center for Epidemiological Studies Depression (CES-D) Scale (Radloff, 1977) developed for the Established Publication for the Epidemiological Study of the Elderly (Kouhou et al., 1993, referred by Wallace & Herzog, 1995). A study by Orme, Reis, and Herz (1986) shows that the original version of the CES-D has adequate factorial and discriminant validity. In addition, the CES-D has an adequate reliability (test-retest coefficient = .59; reliability coefficient α = .90) when used in a sample of cancer patients (Wales, Kane, Robbins, Bernstein, & Krasnow, 1983).

The short version has only 11 items (whereas the original version is a 20-item scale). Participants are asked how often they have been experiencing a list of 11 feelings during the past week and to answer on a four-point Likert-type scale, ranging from 1 = “all or almost all of the time” to 4 = “none or almost none of the time.”

The CES-D appears to be a reliable and valid measure of depression in the entire HRS Wave 1 sample (Wallace & Herzog, 1995). Reliability was measured using the coefficient alpha for all 11 items, which indicated a high internal consistency, .84. Furthermore, an exploratory factor analysis replicated previous factor analytic findings for the CES-D. Three factors emerged: Affect, Psychosomatic Symptoms, and Interpersonal Problems. For the entire sample,

the summary score of the average of the 11 items has a mean of 3.6 (out of a maximum of 4, with 4 being low depression), with a skewed distribution. Initial modeling attempts used the overall CES-D score, but the three subscales were also modeled.

Concurrent, discriminant, and construct validities of the CES-D were also supported in the study by Wallace and Herzog (1995). Concurrent validity is supported by the significant correlations ($\underline{r} = -.57$, $\underline{p} < .001$, $8{,}500 \leq \underline{n} \leq 9{,}750$) between the CES-D score (lower scores indicates depression) and the self-rating of emotional health (higher score indicates poor emotional health). The CES-D is also related to the self-reported presence of emotional, nervous or psychiatric problems.

The CES-D's discriminant validity is supported by the low relationships with cognitive performance measures ($|.15| \leq \underline{r}s \leq |.30|$). However, discriminant validity was not established when comparing the CES-D and the vitality measures found at the end of the CES-D. A factor analysis of all items of the CES-D and the vitality measure suggested that the vitality measures items were more closely related to the psychosomatic dimension of the CES-D, suggesting that vitality and psychosomatic depression were not empirically distinguishable (Wallace & Herzog, 1995).

Finally, construct validity is supported by the fact that depressive symptoms are more frequent among participants suffering from all severe chronic conditions, particularly from stroke, chronic long disease and heart condition

(Wallace & Herzog, 1995). Specifically for cancer patients, participants with active cancer report significantly greater depression on the CES-D (m = 3.46, with 4.00 being no depression) than participants with no reported cancer (m = 3.56, p < .01, 8,600 ≤ n ≤ 9,700) although statistically significant, this effect size is relatively small.

To measure self-rated emotional health, participants were asked to answer the question “What about your emotional health – how good [do] you feel or how stressed, anxious or depressed [do] you feel?” rating their answers on a five-point Likert-type scale, raging from 1 (excellent) to 5 (poor). As already referred, this measure correlated significantly with the CES-D score. In addition, significant correlations were found between this measure and physical health measures, including physical functioning, pain and sensory difficulties (.20 ≤ r ≤ 55, p < .01, 8,600 ≤ n ≤ 9,700).

The presence of psychiatric problems was assessed using four questions (Appendix C, questions B23 to B24b). These questions rate the presence of psychiatric problems in five ordinal categories: absence of psychiatric problems (present or past), psychiatric symptoms more than a year ago; presence of recent (during the past year) psychiatric symptoms, presence of psychiatric or psychological treatment or the use of psychiatric medication; and presence of psychiatric or psychological treatment and the use of psychiatric medication.

Procedure

The study involves a nationally representative sample of individuals who were aged 51-61 in 1992 and their spouses. Participants were approached by an interviewer (face to face interview) and paid $10.00 per person or $30.00 for both parts of the couple. In case of a refusal was identified by the interviewer, a second attempt was made, with a different interviewer and the financial incentive was doubled ($20.00 per person or $60.00 for both parts of the couple). This second attempt strategy added 503 cases. For the individuals who still refused, a one-page Federal Express letter was sent, explaining that a substantial financial incentive ($100 per person and $299 for both halves of the couple) would be given and that an interviewer would call shortly after. Six hundred twelve cases, from what had been previously refusals, were added with this third attempt strategy. These strategies resulted in a response rate of 82% and a total sample size of 12,654 (Juster & Suzman, 1995).

The approximate time for answering the core sections of the survey is 130 minutes. The Demographics and Physical Health and Function sections, answered by both people in the household, took approximate 3 and 15 minutes, respectively, to answer. The Family Structure and Transfers section (Table 6) was only answered by the female respondent in a two-spouse household. All unmarried respondents (or with no co-residential partner) provided information about their own family structure.

CHAPTER III

RESULTS

This study tests six different theoretical models of the relationships between the main latent constructs (Social Support, Psychological Distress and Illness Stress), using a Structural Equation Modeling (SEM) procedure. As developed in the method section, each theoretical latent construct was measured through several (manifest, or observed) indicators. Since SEM is not as familiar to most researchers as other statistical procedures, a brief overview of its basic principles is first presented.

Overview of Structural Equation Modeling (SEM)

Basic concepts in SEM. SEM is a multivariate technique that allows testing a series of simultaneous dependence relationships between several dependent and independent variables in a theoretical model (Hair, Anderson, Tatham, & Black, 1998; Maruyama, 1998). As these relationships are assessed comprehensively and simultaneously, SEM is well suited for testing a series of relationships constituting a model, a set of fundamental principles, or a theory.

SEM is derived from a combination of factor analysis and path analysis. Factor analysis allows estimating latent constructs, or factors, with multiple measured variable components. In factor analysis, the researcher can specify the number of factors, but all variables act as (stronger or weaker) indicators of each

factor. In SEM, the researcher specifies which variables are indicators of each latent construct. In addition, a priori relationships between these latent constructs is specified and tested in SEM.

Path analysis employs bivariate correlations to form regression-like equations with multiple variables. SEM augments the scope by adding capabilities to analyze multiple relations between latent constructs (path analysis) and their measurement models (factor analysis).

In SEM, the researcher determines which independent and dependent variables predict other dependent variables. This determination is based on prior experience, theory, or research goals. Next, the proposed relationships are translated into a set of equations that describe hypothesized structures of the relationships. Thus, the name structural equation analysis or SEM is used (Maruyama, 1998). Two key concepts to SEM are manifest (observed) variables and latent constructs (Bentler, 1992). Manifest variables, used as indicators of latent constructs, refer to observed values for a specific item or question. Since no measurement is free of error, each manifest variable typically has an error component associated with it in SEM. Latent constructs refer to non-observable theoretical concepts. Although non-observable, latent constructs can be represented by the relationships between observed indicators. For example, in this study the following indicators as modeled to be caused by the latent construct Psychological Distress: CES-D subscales, presence of psychiatric problems, and self-rated emotional health (as shown in Figure 3).

The specification of which observed indicators form each latent construct constitutes a factor analytic measurement model. In addition, testing the factor analytic measurement models of each latent construct allows the researcher to assess the reliability of each indicator for estimating the causal relationships between the latent constructs (Hair, Anderson, Tatham, & Black, 1998). Three measurement models were tested in the present study, corresponding to the three main constructs: Social Support, Psychological Distress, and Illness Stress. In addition, several possible relationships between these constructs, represented by the structural model, were tested (Table 2).

Factor analysis components and the structural model "causal components" can be represented by a diagram, with paths (double or single arrows) linking observed variables to latent constructs (Figure 3). In the path diagram, dependent, or endogenous variables, predicted by other latent constructs, are represented with at least one causal arrow pointing towards them. Thus, independent, or exogenous variables have only causal arrows leading out of them and are not predicted, or "caused" by any other latent construct in the model. Thus, Independent, or exogenous variables act only as predictors of other variables constructs in the model. A double headed, often curved arrow linking two variables represents a correlation, not a causal link, between the two variables (Maruyama, 1998). Such correlations are used to show unmeasured variables that may cause two measured variables or latent constructs to be related.

Steps in SEM. Hair, Anderson, Tatham, and Black (1998) summarize the steps in SEM. The first step is to develop one or more theoretically based models. Barrera (1986) provides an excellent overview of six possible models representing the relationships between the general theoretical constructs of Stress, Social Support and Distress (Table 2).

A basic idea of SEM is that it represents causal relationships (i.e., causal modeling), in which change in one variable results in change in another variable. A theoretical basis for this hypothesized causal relationship is fundamental. Although Barrera (1986, 1989) provides some theoretical grounding to his models, an essential aspect is lacking in this current study: temporal antecedence of the cause versus the effect. Temporal antecedence is only possible to examine with longitudinal research, not with this cross-sectional data. Therefore, the findings from this study will need more confirmation, only possible with prospective, longitudinal data analysis.

The second step is the construction of a path diagram of causal relationships between the specific operationalization of the general theoretical constructs. The possible relationships between the constructs are numerous (Figure 3), but not exhaustive, in Barrera's models (1986). It is important to note at this point that these theoretical models of tye mutual influence of latent constructs on one another can only be tested with measured indicators from a specific context.

There are four possible relationships between Stress and Social Support (Table 2). Stress can be a positive predictor (Effective Support Mobilization Model and Support Seeking/Triage Model) or a negative predictor of Social Support (Stress Prevention Model and Support Deterioration Model). In addition, the Reciprocity Model depicts a mutual influence between Social Support and Stress and the Additive Model depict no relationship between these two constructs. Social Support can be a positive (Stress Prevention and Support Seeking/Triage Models) or a negative predictor of Distress (Effective Support Modification, Support Deterioration, Additive, and Reciprocity Models). Finally, Stress is considered as a positive predictor of Distress in all models.

The third step refers to converting the path diagram into a set of structural and measurement models (i.e., empirical equations). The different structural models vary according to the theoretical models characterized in Table 2. There are three measurement models, one referring to each main construct. The number of possible indicators per construct varies according to the latent construct.

First, some indicators might be more related to the construct than others (having higher or lower loadings, respectively). Second, the indicators might have different relationships with the constructs (positive or negative loadings). Finally, some indicators might actually be more representative of other constructs, or subconstructs, than what was initially thought. For example, Social Support includes Structural and Perceived Support measures, which might have different

effects on Illness Stress and Psychological Distress. Only an exploratory factor analysis will allow to differentiate these effects and to indicate the usefulness of separating the initial Social Support construct into two constructs: Structural and Perceived Social Support. An exploratory factor analysis might also suggest that some of the indicators should be removed (in case of having too low a loading on the factor).

In sum, an exploratory factor analysis will provide more information about which manifest variables should be part of the measurement models. These measurement models can then be tested using a confirmatory factor analysis (Anderson & Gerbing, 1988). Six theoretical models depict the structural relations among the three latent constructs (Table 2).

The fourth step is to choose the matrix type and to estimate the proposed model. Since the focus of SEM is the pattern of relationships between variables, the input for SEM is actually a correlation or variance-covariance matrix of all the observed indicators used in the model. In this study, variance-covariance matrices were used.

There are several estimation methods and advantages and disadvantages of each vary according to several factors, such as the degree of departure from normality. Examples of estimation methods are maximum likelihood, weighted least squares, or generalized least squares estimation, among others. The computer program used, EQS (Bentler, 1992), has been known for placing less

stringent assumptions on the multivariate normality of the data (Hair, Anderson, Tatham, & Black, 1998).

The fifth step refers to assessing the identification of the structural model, or the ability of the proposed model to generate unique estimates. This is dependent on the number of degrees of freedom, or, in other words, the difference between the number of coefficients to be estimated in the proposed model and the number of correlations or covariances.

The sixth step is evaluating goodness-of-fit criteria, or measures of matching between the observed and the expected model. Goodness-of-fit is assessed for the measurement and the structural models. A chi-square is used to evaluate the departure between the observed and the expected (or theoretical) model. A non-significant chi-square represents a good match between the actual data and the theoretical model.

The last step refers to the interpretation and modifications of the model. If the model was evaluated to be acceptable, the results should be re-examined in light of the proposed theory. If modifications are indicated, theoretical justifications should be sought for the proposed model changes.

Measurement Models

The CES-D was initially constructed in the direction of a lower score indicating more depression. However, all manifest variables in this study were measured in the direction of a higher score indicating more of the latent construct that variable is associated with (i.e., in the direction of the construct name). For

example, a higher score of “poor quality of life” is related to more psychological distress. Therefore, CES-D scores were reversed in this study so that a higher score is indicative of more depression.

After the appropriate scores were reversed, three main exploratory factor analyses in principal components (rotation: varimax normalized) were performed, one for each main latent construct. These exploratory factor analyses assisted in the selection of the observed variables that load in each main latent construct. Items with very low loadings on the respective factor were not considered. In case of constructs originally conceptualized as a two-factor structure, such as Illness Stress, items with very high loadings on both factors were also not considered.

The exploratory factor analyses were followed by confirmatory factor analyses (i.e., measurement modeling). The vast majority of the observed variables have a non-normal distribution. The Mardia’s coefficient, a measure of multivariate kurtosis, was 186.22. Therefore, the Arbitrary Distribution Theory Generalized Least Square Solution (AGLS) method was used for the confirmatory factor analyses. Measurements of goodness of fit (Table 8) included the Corrected AGLS Chi-Square, with a significant χ^2 supporting the hypothesis that the observed and expected models are different, and the Corrected Comparative Fit Index (Yuan & Bentler, 1997). The item with the highest loading in the exploratory factor analysis was set as a marker (fixed parameter, with a value of 1.00).

Social Support. Barrera (1986, 1989) classified three kinds social support measures: social embeddedness (or structural support), perceived support, and enacted support. The HRS Wave 1 questionnaire did not include measures of enacted support. Therefore, two main Social Support factors were expected; one composed by variables measuring the satisfaction with different social support sources (Perceived Social Support), and the other composed by variables measuring the amount of social support received (structural social support).

Structured Social Support variables included: marital status, number of children living with participant, frequency of contact with children away from home, presence of relatives and good friends in neighborhood, frequency of contact with neighborhood friends and relatives, and number of hours spent in volunteer work. However, an exploratory factor analysis failed to replicate this theoretical two-factor model. Since questions referring to the Structural Social Support were only answered by the female participants in any two-person household, the female's answer was taken as an estimation of the respective male's Structural Support when the male was the cancer patient. This was done regardless of the wife having or not having cancer. The number of couples with both members having cancer was only one in this data set.

Other two- and three-factor structures were attempted, but results did not fit the data well. Therefore, only variables measuring Perceived (or satisfaction with) Social Support were included in the model. Contrary to the Structural Social Support measures, only answered by the female participants, all measures

referring to satisfaction with Social Support were answered by all participants; thus dropping structural measures removed the method issue of source of data.

The exploratory factor analysis suggested the presence of a single factor, Satisfaction with Social Support, composed by five variables measuring Satisfaction With Neighbors, Friends, Marriage, Family Life, Enjoyability of Time Spent with Spouse (Table 9). This factor explained 43.49% of the variance. The reliability coefficient (standardized alpha) for the scales composed by these five items was $\alpha = .67$.

The confirmatory factor analysis failed to support that this model and the data do not differ significantly, $\chi^2(5) = 15.31$, $\underline{p} = .0091$. The Lagrange Multiplier Test shows the change in overall model fit and significance of adding particular parameters. This test suggested the addition of another parameter, the intercorrelation between the residual terms for the variables Satisfaction with Neighbors and Satisfaction with Friends. Such correlated error terms suggest the presence of unmeasured variables that are causing the two measured variables to be related. Because of the similar nature of these two variables, this is a reasonable assumption. A second model was run with this correlated error term and results suggest better fit: $\chi^2(4) = 6.89$, $\underline{p} = .16$. This result was also supported by the other goodness-of-fit indices (Table 8).

Illness Stress. Ries, Kosary, Hankey, Miller, and Edwards (1998) report five-year survival rates by primary cancer site for the time period 1989-1994. Using this information each reported cancer site (most recent cancer) was

matched with the respective survival rate. The survival rates for “all cancer sites” (59.9%) was used in case participants reported a cancer site that was not identified by Ries et al..

The exploratory factor analysis suggested the presence of two factors, Poor Health and Cancer (Table 10). The Poor Health factor explained 33.35% of the total variance and was composed by five items, with loadings ranging from .48 to .86. The standardized alpha for the scale composed by the five Poor Health items was $\alpha = .77$.

The second factor, Cancer, explained an additional 20.45% of the variance, and was composed by three items: time since cancer diagnosis, saw doctor during the last year, and survival rate. The reliability coefficient (standardized alpha) for the scale composed by these three items was $\alpha = .56$.

An exploratory factor analysis using all items revealed that the factor Cancer had very low correlation with the Poor Health, Psychological Distress, and Social Support factors. Therefore, only the Poor Health factor was tested as a single factor measurement model. The confirmatory factor analysis revealed a good fit, as measured by the chi-square, $\chi^2(5) = 2.00$, $\underline{p} = .85$, and other goodness-of-fit indices (Table 8).

Psychological Distress. The eleven CES-D items were separated into three subscales: Affect, Psychosomatic, and Interpersonal Depression. This previously described factor structure (Wallace & Herzog, 1995) was replicated with the subsample of cancer patients with a spouse/partner. Using the global

CES-D score led to a non-identified solution in the confirmatory factor analysis due to the limited number of manifest variables (CES-D Total, Psychiatric Problems, and Emotional Health). Therefore, the Psychological Distress latent construct was formed by five items: the three CES-D subscales, presence of Psychiatric Problems, and self-rating of Emotional Health.

As expected, the five Psychological Distress items formed a single factor (Table 11). The item loadings in exploratory factor analysis were relatively high (ranging from .64 to .83), and the factor explained 56.18% of the total variance. The reliability coefficient (standardized alpha) for the scale composed by these five items was $\alpha = .78$. The confirmatory factor analysis suggested that the reproduced matrix model was not significantly different from the observed data: $\chi^2(5) = 8.14$, $p = .15$. In addition, all fit indices indicated an excellent fit (Table 8).

Gender Differences

The manifest (or observed) variables were tested for differences between the male ($n = 174$) and female cancer patients ($n = 340$), using independent sample t-tests (Table 5). Subsequently, the magnitude of mean difference, if statistically significant, was evaluated through the computation of effect size, eta. This is especially important taken into consideration the likely high power of the t-test to detect small differences between gender groups, due to a relatively large sample size.

When considering this subsample of cancer patients with a spouse or partner, no gender differences were noted for the Psychological Distress or

Social Support variables, with one exception. Male cancer patients reported being more satisfied with their marriage (m = 4.78, SD = .54) than female cancer patients (m = 4.64, SD = .90), t(497) = 2.29, p = .022, with a small to moderate effect size (eta = .18).

Several differences were found for Illness Stress variables, with males generally reporting worse health than females. Specifically, males reported a worse Quality of Life [t(294) = 2.40, p = .017], and greater Number of Health Conditions [t(512) = 2.07, p = .039] than females (see Table 5 for means and standard deviations). However, these mean differences may not be clinically meaningful, as shown by their small effect size (eta = .11 and .09, respectively).

Since these comparisons were performed using multiple univariate tests, there is an increase of type I error. When using a Bonferroni correction to control for type one error (α = .002), all these previously significant gender differences become non-significant.

Structural Models

First, a correlation matrix (Pearson r) for the observed variables was constructed (Table 12). Although the SEM analyses were not based on this matrix, its observation provided some information concerning the univariate relationship between the variables. Specifically, correlations between Illness Stress and Psychological Distress variables were all positive, with an average r = .28 (ranging from r = .48, p < .001 to r = .05, p >.05). In addition, Social Support variables were all negatively related to both Illness Stress (average r = -.10,

ranging from r = -.07, p > .05 to r = -.15, p <.001) and to Psychological Distress variables (average r = -.21, ranging from r = -.13, p = .002 to r = -.30, p <.001).

Like the confirmatory factor analysis, the structural models were based on the variance-covariance matrix (Table 13), using the Generalized Least Squares Solution (arbitrary Distribution Theory). Models were first run in their simplest forms, with no intercorrelations between error terms. If results suggested a poor fit of the model to the observed data, modifications to the initial model were performed and successively evaluated.

These modifications were based in two criteria. First, they were suggested by the Lagrange Modifier test. Second, only significant paths that were supported by substantial theory were added to the model. Therefore, only intercorrelations between error terms were allowed. Neither item cross-loadings nor direct cause of a construct by an unrelated indicator were allowed.

The Lagrange Modifier test also suggested, for most of the models, a significant cross-loading (an item loading in two factors) of the observed variable Emotional Problems onto the latent construct Illness Stress. The observed variable Emotional Problems thus was removed from the structural analyses, which lead to a better fit. This strategy was also consistent with the constraint set during the factor analysis (item with factors cross-loading were removed).

The Stress Prevention Model (Model 2, Figure 4), when run in its simplest form, was significantly different from the data, $\chi^2(88) = 165.74$, p < .00001, Corrected Comparative Fit Index (CCFI) = .81. When intercorrelations between

error terns were added, the model was still significantly different from the data, $\chi^2(71) = 103.78$, $\underline{p} = .0068$. However, goodness-of-fit indices indicated a better match (CCFI = .90, Table 8); and a significant improvement in fit $\Delta \chi^2(\Delta \text{ df} = 17) = 61.96$, $\underline{p} < .001$. Specifically, the following pairs of error terms were freed and were significantly correlated: Satisfaction With Marriage and Time Spent with Spouse ($\underline{r} = .20$, $p = .0060$); Poor Activities of Daily Living and Number of Days Home Sick ($\underline{r} = .29$, $\underline{p} = .0080$); Pain and Psychological Problems ($\underline{r} = .14$, $\underline{p} = .0011$); and Pain and Psychosomatic Depression ($\underline{r} = .55$, $\underline{p} = .000048$).

Structural path coefficients representing predictive relationships between the latent constructs indicated that higher Social Support predicted lower levels of Illness Stress ($\beta = -.19$, $\underline{p} = .015$) and that Illness Stress positively predicted Psychological Distress ($\beta = .55$, $\underline{p} < .00001$). Figure 4 presents the final Stress Prevention model with standardized coefficients.

The Buffering Model (Model 1) is similar to the Support Deterioration Model (Model 3, Figure 5), with the only difference being in the direction of the relationship between Illness Stress and Social Support. According to the Buffering Model, higher Social Support is predicted by higher levels of Illness Stress. The Support Deterioration Model predicts this relationship in the opposite direction, higher levels of Social Support are predicted by lower levels of Illness Stress. The two models were tested simultaneously and evidence was only found for the Support Deterioration Model.

When the Support Deterioration Model (Model 3, Figure 5) was run in its simplest form, results suggested an inadequate match between the observed and theoretically reproduced data matrix. The Lagrange Modifier test suggested that the item Emotional Problems was caused not only by Psychological Distress, but also by Illness Stress (cross loading). This item was thus, again, removed and several intercorrelations between error terms were added.

In the Social Support measurement models, two pairs of error terms were intercorrelated: Satisfaction with Neighbors and Satisfaction with Friends (r = .16, p = .014); and Satisfaction with Marriage and Time Spent with Spouse (r = .22, p = .00071). In addition, the following pairs of error terns were correlated (the first item from the Illness Stress measurement model and the second from Psychological Distress): Pain and Psychiatric Problems (r = .13, p = .013), Pain and Psychosomatic Depression (r = .25, p = .00043); and Number of Days Home Sick and Psychosomatic Depression (r = .27, p = .023). Although the resulting model was still significantly different from data, $\chi^2(69) = 96.7$, p = .016, CCFI = .91, the goodness-of-fit indicates an adequate fit (Table 8).

Standardized structural path coefficients for the Support Deterioration Model representing predictive relationships between Social Support, Illness Stress, and Psychological Distress indicated that illness Stress negatively predicted Social Support (β = -.51, p < .00001) and positively predicted Psychological Distress (β = .39, p < .00001). In addition, Psychological Distress is also negatively predicted by Social Support (β = -.39, p < .00001). The

directions of these predictions are congruent with the expected according to the theoretical model. Figure 5 present the final Support Deterioration Model.

The Additive Model (Model 5) is embedded in the Support Deterioration Model (Figure 5). With the exception of the path between Illness Stress (predictor) and Social Support, absent in the Additive Model, the two models are identical. Therefore, the intercorrelation paths in Support Deterioration Model served as a starting point to test the Additive Model. In other words, the Additive Model was first tested with the same intercorrelating error terms as the Support Deterioration model. However, the Additive Model resulted in an EQS condition code, with the error term for the psychosomatic depression being constrained at a lower bound. Under these conditions, the Chi-Square statistic will not necessarily have the proper distribution.

After adding intercorrelations between error terms, the Support Seeking/Triage Model (Model 4, Figure 6) approached non-significance, $\chi^2(69) = 97.70$, $p = .016$. The match between the observed and the expected models was also confirmed by adequate goodness-of-fit indices (Table 8). As shown in Figure 6, intercorrelations were set for the following pairs of error terms: Satisfaction with Neighbors and With Friends ($r = .16$, $p = .014$); Satisfaction with Marriage and Time Spent with Spouse ($r = .22$, $p = .00071$); Pain and Psychological Problems ($r = .13$, $p = .014$); Pain and Psychosomatic Depression ($r = .25$, $p = .00043$) and Number of Days Home Sick and Psychosomatic Depression ($r = .27$, $p = .008$). Contrary to the expected, Social Support was negatively predicted by

Illness Stress (β = -.25, p = .0040) and Psychological Distress (β = -.45, p = .000011). Figure 6 present the final Support Seeking/Triage Model.

Finally, the Reciprocity Model (Model 6) did not converge to a stable solution. In sum, empirical evidence was found for two models: Support Deterioration and Stress Prevention Models.

Univariate Test of Stress Buffering Model

The Stress Buffering Model (Cohen & Wills, 1985) (Figure 1) and its extension, the Model of Curvilinear Stress Buffering Effects (Barrera, 1989) (Figure 2), both predicting statistical interactions, were tested using an univariate approach. Consistently with the other analyses, the sample was limited to the same cancer patients with a spouse/partner.

In the univariate approach, a single calculated score represented each main construct (Illness Stress, Psychological Distress and Social Support). Illness Stress was represented by the average between two variables: Activities of Daily Living (Poor ADL) and Quality of Life (Poor QoL). These two variables were chosen because of two reasons: they were measured in the same 5-point rating scale; and they were the variables with the highest loading in the latent construct Illness Stress. Psychological Distress (depression) was represented by the CES-D full-scale score. Lastly, Social Support was represented by the average of the four Satisfaction with Social Support items. Enjoyability of Time Spent with Spouse was not included because it was measured in a different rating scale (3-point rating scale instead of a 5-point rating scale). The first (4.25)

and fourth (5) quartiles were used as cut-offs to separate Social Support into high (n = 195) versus low (n = 155) extremes.

First, the Pearson r correlation between Psychological Distress (depression) and Illness Stress (Poor ADL and Poor QoL) was calculated for the two Social Support groups. The correlations for the two groups were not different: r = .47, p < .001 for the low social support group; and r = .45, p < .001 for the high social support group.

In an attempt to reproduce Figure 2 (Model of Curvilinear Stress Buffering Effects, Barrera, 1989), participants were separated into 4 groups according to their level of Illness Stress: low equal, moderately low, moderately high, and high. The quartiles for the variable composed by the average of Poor QoL and Poor ADL were used as cut-off points (1.9, 2.2, and 2.7).

A 2 x 4 between-subjects analysis of variance (ANOVA) was performed (Figure 7). Two levels, high and low, compose the first factor, Social Support. The second factor is Illness Stress, which composed by four levels: low, moderately low, moderately high, and high.

Both main effects (Illness Stress and Psychological Distress) were significant, but not the interaction, which had a small effect size (eta = .12). Relatively to the main effect of Psychological Distress (depression), patients with low Social Support (lower quartile) reported higher Distress (m = 1.59, SD = .50) than patients with high Social Support (top quartile) (m = 1.36, SD = .40), F(1,352) = 21.40, p < .0001. This test had a large effect size (eta = .45).

In addition, a main effect of Illness Stress was found, $F(3,352) = 28.33$, $p < .0001$, with a moderate effect size (eta = .24). Planned comparisons revealed a significant linear trend, $F(1,342) = 77.60$, $p < .00001$, with Psychological Distress (Depression) increasing with Illness Stress and no difference between low and moderately low levels of Illness Stress (Table 14 presents means and standard deviations).

CHAPTER IV

DISCUSSION

Structural Equation Models

Barrera (1986, 1989) describes six possible theoretical relationships between Social Support, Life Stress and Distress. These models were empirically tested, using a Structural Equation Modeling (SEM) approach for a national sample of married men and women with past or current cancer selected from the HRS data set. When operationalizing Life Stress as Poor Health in cancer patients with a spouse/partner, evidence supported two models: Stress Prevention and Support Deterioration. Although an acceptable fit was found for the Support Seeking/Triage Model, two of the three paths between the latent constructs were in the opposite direction than expected. Therefore, this model not was considered to be supported.

The findings in this study support Barrera's affirmation (1986, 1989) that Stress Prevention and Support Deterioration models are mainly observed when using perceived social support measures. All Social Support indicators used in this study refer to satisfaction with several aspects of the participant's social support. Further research including measures of social embeddedness and enacted social support would be necessary to fairly test the other models as proposed by Barrera. As suggested by Barrera, the fact that no support was

found for the Effective Mobilization, Support Seeking/Triage, Additive and Reciprocity models does not indicate that these models are not applicable to this population. Instead, it indicates the need for further research including better measures of social embeddedness and enacted social support.

Measurement Models

Initial modeling attempts were made including social embeddedness (or structural social support) measures. However, a stable solution was not found, which might be due to increased measurement error for structural social support. Since male patients with a spouse/partner did not answer the structural social support measures, the answers of their wives/partners were taken as an estimation of the male participant's structural social support, probably increasing measurement error. Furthermore, the present study was limited by its archival nature and the inability of choosing reliable and well-validated social support measures.

Exploratory and confirmatory factor analyses were both performed using the same data, in the present sample. A cross-validation of the measurement models will be possible in a longitudinal sample (by replicating the measurement models using data from the HRS Waves 2 and 3).

Although a Cancer factor (composed by the following variables: Cancer Severity Rate, Time Since Diagnosis, and Saw Doctor During Last Year) was initially found, it was dropped from the structural analyses because of its low intercorrelation with the other Illness Stress factor or with Psychological Distress

or Social Support. These results are similar to those found by Van Servellen, Sarda, Padilla and Brechy (1996). In their study, severity of illness, time since diagnosis, and number of hospitalizations were not associated with emotional distress in a sample of 60 men with cancer or AIDS. However, functional status and social support was associated with depression. This suggests the importance of taking into account these variables when predicting the cancer patient's emotional well-being or the risk for developing depressive symptoms.

SEM Models: Intercorrelations of Error Terms

Error term intercorrelations (suggested by the Lagrange Modifier Test) were empirically based. However, they first had to be theoretically justifiable. The large statistical power, consequent to a large sample size (n = 503), also lowered the possibility of chance finding in the Lagrange Modifier (LM) Test.

Nevertheless, numerous potential correlations were suggested between the error terms by the LM test. This might be due to several factors. First, the error intercorrelations between the variables causing the Illness Stress and Psychological Distress latent constructs suggest that these two latent constructs are related to each other, and probably there is some overlap of these two constructs. The error intercorrelations might also suggest the presence of another unmeasured construct such as general well-being, which is consistent with the fact that only positive intercorrelations between the error terms were suggested by the LM test.

The Social Support measurement model also predicts intercorrelations between error terms. The high correlation between the error terms of the variables Satisfaction with Neighborhood and Satisfaction with Friends indicates that there might be an overlap between these two concepts. In fact, proximity suggests that an important part of the participants' friends are within the neighborhood where participants live. This also suggests that there is "something" specific about neighbors and friends that is not accounted by this Social Support construct. The intercorrelation between the error terms of the variables Satisfaction with Marriage and Enjoyability of Time Spent with Spouse is likely due to both measuring the quality of the marital relationship.

The numerous intercorrelations between error terms might also be reflective of low construct reliability. This is supported by the relatively low internal consistency coefficients (standardized alpha) for the scales composed by the observed variables loading on each latent construct. The observed variables seem to provide low discriminate power between the latent construct that they are supposed to measure and other latent construct that the variables may also measure in addition to the first one. For example, the observed variables Satisfaction with Marriage and Enjoyability of Time Spent with Spouse seem not only to be measuring the latent construct Social Support, but also quality of marital relationship, as represented by the significant error intercorrelation between these two observed variables.

Stress Buffering Model: Univariate vs. Multivariate Approach

The Analysis of Variance (ANOVA) clearly showed main effects and no interaction between the two levels of Social Support and the four levels of Illness Stress. The main effects of Social Support and Illness Stress on Psychological Distress were statistically significant and probably clinically meaningful, as suggested by the moderate and large effect sizes. This supports the Main Effect Model (Model 5) and rejects the Stress Buffering Model (Model 1). According to the Main Effect Model, Social Support has an overall beneficial effect on individuals independent of their level of stress (Cohen & Wills, 1985).

The fact that the ANOVA confirmed the Main Effect Model and not the Stress Buffering Model is consistent with the proposed by Cohen and Wills (1985). These authors assert that the Stress Buffering Model is mainly supported by studies assessing Functional Social Support. Functional Social Support measures evaluate specific behaviors that providers perform when helping an individual. The present study, limited by its archival nature, did not include measures of Functional Social Support.

Cohen and Wills (1985) conjecture that “evidence for a main effect model is found when the social support measure assesses a person’s degree of integration in a large social network” (p. 310). The present study also shows that the Main Effect Model can be supported with Social Support measures targeting only the participant’s perception or degree of Satisfaction with Social Support sources, and not the actual structure of the social network. In other words,

measures of Structural Social Support, or Social Embeddedness, are not a necessary condition to support the Main Effect Model.

Numerous studies focusing on the relationship of Social Support, Stress and Distress measured Stress through life events checklists. For example, Funch and Marshall (1983) showed that Subjective Stress was negatively related to survival time in younger women with breast cancer. In addition, Objective Stress was negatively related to survival time in older women. Stress was measured prospectively, as the number of stress events occurring in the five-year period preceding breast cancer diagnosis. For all age groups except the 40-60 year old, stress and social involvement accounted for twice as much as variance in survival as did stage of cancer.

Besides survival rate (Ell, Nishimoto, Mediansky, Mantell, & Hamovitch, 1992; Funch & Marshall, 1983), both psychological and physical symptomatology, as well as general well-being, have been used as outcome measures of the effects of the stressful events (Cohen & Wills, 1985). Although physical health was conceptualized as a stressor in the present study, and not as an outcome measure, there was still a significant overall beneficial effect of social support on psychological distress.

Consistently with the ANOVA results, the Stress Buffering Model, or Effective Support Mobilization Model, was also not supported by the SEM. The same consistency was not found for support of the Main Effect Model; this model,

supported by the ANOVA, did not show a good fit in SEM. Several reasons might explain this apparent difference.

First, different variables were used for the SEM and the ANOVA. Second, the SEM and the ANOVA approach test different aspects of the data. The former is based in the variance-covariance matrix and tests predictive relationships between constructs, whereas the latter only tests mean differences.

Third, the Effective Support Mobilization Model (or Buffering Model, Model 1) predicts that changes in Illness Stress and Social Support make independent contributions to changes in Psychological Distress. However, both the Stress Prevention and the Support Deterioration Models show a significant path between Social Support and Illness Stress. As shown by the ANOVA, the level of Psychological Distress is influenced by the levels of Social Support and Illness Stress. This suggests that changes in Psychological Distress are not due to the interaction between the Social Support and Illness Stress, but rather to the effect of a mediating path linking Social Support to Psychological Distress.

Specifically, Illness Stress in cancer patients with a spouse or partner tends to deteriorate the availability or effectiveness of Social Support (Support Deterioration Model). The Stress Prevention Model provides an alternative explanation: Social Support prevents the occurrence of stressful situations or reduces the perceived threat of Illness Stress. Only a longitudinal study would allow differentiating these two possible explanations.

The Buffering Model, or Effective Support Mobilization Model (Model 1) predicts that Illness Stress results in mobilization of Social Support. In other words, there is a positive relationship from Illness Stress to Social Support. As shown by the Stress Prevention and the Support Deterioration Models, as well as by the univariate correlations, the relationship between Illness Stress and (perceived) Social Support is negative.

Limitations to Generalizability

The present study was based on a large, nationally representative sample that oversampled minority groups and Florida residents. However, certain aspects limit the generalization of the results. This present study only included cancer patients with a spouse/partner. A cross-validation study would provide important information about the application of the Stress Prevention, Support Deterioration and Main Effect models to unmarried populations, populations with other kind of medical conditions or even other kind of non-medical stressors. Since the HRS study only included individuals near retirement age (ages between 51 and 61 years) and their spouses (regardless of the spouse's age), studies are also needed using participants at different life-span stages.

Finally, replication of results is needed for participants without a spouse or partner. This is especially important since the Social Support network is probably very different for these two populations. Differences between individuals with and without a spouse/partner might be found in the perception the individual's Social

Support, the degree of Social Embeddedness (Structural Social Support) and the type of supportive behaviors (Enacted Social Support).

Treatment Implications

The relationship between Social Support and Illness Stress is fundamental for both the Stress Prevention and the Support Deterioration Models. A distinction between these two models in only possible using longitudinal data. Although limited by its cross-sectional nature, the present study could be expanded by adding information from the HRS Waves 2 and 3.

In the Stress Prevention Model, the stress processes are altered by Social Support through two possible mechanisms (Barrera, 1989). The occurrence of stressful conditions might be prevented by Social Support. Social support might also have a less direct effect, not by affecting the stressful conditions themselves, but instead by affecting the individual's perception, or appraisal, of the stressful event (Lazarus & Folkman, 1984). By changing the cognitive appraisal processes, Social Support decreases the threat value of the life stress experience, thus reducing the magnitude of the experienced distress. Regrettably, there were no indicators of primary and secondary appraisal processes in this archival study.

A study by Folkman, Lazarus, Gruen, and DeLongis (1986) showed evidence that primary appraisal and coping variables are significant predictors psychological symptoms but not of somatic health status in a sample of 75 married couples. A significant negative relationship between active coping style

and depression was also found by Sherbourne, Hays, and Wells (1995) in a sample of 604 depressed out-patients.

Lin, Dean, and Ensel (1986) also found evidence of the Stress Prevention Model in a longitudinal study about Social Support, life events and depression. Similarly to the present study, Lin and her collaborators measured depression using the CES-D and tested the models with a SEM approach.

Irwin and Kramer (1989) found that Social Support failed to predict changes in depression after controlling for initial levels of depression in 181 radiation therapy patients. This longitudinal research, data was collected at the onset of the treatment, shortly after the cancer diagnosis, and at treatment completion six weeks latter. The Social Support measure targeted the satisfaction with the socio-emotional support and the depressed symptoms were measured using the SCL-90-R (Derogatis, 1977). According to the Stress Prevention Model, results from the Irwin and Kramer study could be due to path between Illness Stress and depression but not a direct path between Social Support and depression.

The Stress Prevention Model suggests that helping cancer patients to maintain or increase their social support will probably result in less Illness Stress. Educating patients about the relationship between Social Support and Illness Stress might serve as a motivator for a more active role in seeking social support. Patients more satisfied with their social support resources will probably report less pain, higher quality of life, improved activities of daily living, and fewer

days home sick. In psychosocial interventions with cancer patients, social support might be conceptualized as an important aspect of health behaviors. Thus, the concept of health behaviors might be broaden to also include positive relationships with elements of the social network. Maintenance or even increase in patient's social support, either through peer-support groups or positive relationships with spouse, family and friends, seems to result in decreased Illness Stress, and, consequently, decreased Psychosocial Distress. A patient who is more aware of this relationship might also be more motivated to actively seek positive relations and the help of others.

According to the Support Deterioration Model stress deteriorates the perceived effectiveness or availability of support which, in turn, is related to Psychological Distress (Barrera, 1989). Studies using depression as a measure of psychological distress support this model. For example, Social Support was found to mediate the relationship between functional status and depression in a study about the life stress processes in family caregivers of cancer patients receiving chemotherapy (Shumacher, Dodd, & Paul, 1993).

Although lacking information about the relationship between Illness Stress and Social Support, a study by Van Servellen, Sarda, Padilla and Brechy (1996) also seems to provide evidence for the Support Deterioration Model. In their study, depression was associated with poorer functional status, increased stressful life events, and lower Social Support. Availability of Social Support was a significant predictor of less depression. In addition, patients with higher

depression levels reported more satisfaction with their Social Support than patients with lower depression levels.

The significant path from Social Support to Psychological Distress in the Support Deterioration Model suggests that increasing Social Support can decrease the negative impact of Illness Stress on Psychological Distress. Fostering Social Support could be done by working with the families, by implementing support groups, or by helping the cancer patients to reduce negative perceptions of their Social Support.

Finally, the Main Effect Model suggests that, independent of the patient's level of Psychological Distress, Social Support has a negative impact on Psychological Distress. This implies that both patients with moderate and high levels of Psychological Distress could benefit from interventions aiming at maintaining or increasing Social Support levels.

Conclusions

When measuring social support by the level of satisfaction with several social support sources in a sample of 503 cancer patients with a spouse/partner, evidence is found for the Main Effects Model, the Stress Prevention Model, and the Support Deterioration Model. There was no evidence for the Reciprocity, Support Seeking/Triage, and Effective Support Mobilization (Stress Buffering) Models models. Both the Stress Buffering and the Support Seeking/Triage Models predicted a positive relationship between Stress and Social Support. In

other words, there is no evidence that married cancer patients with increased Illness Stress will seek more Social Support.

However, these conclusions are limited to cancer patients with a spouse/partner in which one of the elements of the couple is in the 51-61 age range. The conclusions from the present study should also be limited to the aspects of social support measured: satisfaction with social support sources (Perceived Social Support).

The Main Effects Model suggests that, independently of the level of Illness Stress, cancer patients with higher levels of social support display lower levels of depression. Therefore, both Illness Stress and Social Support make significant contributions to the level of depression. This effect is observed when Stress is measured through poor health measures (such as pain, poor quality of life, poor activities of daily living, and number of days home sick) and the outcome measure is depression. Previous studies had shown evidence for a more general beneficial effect of Social Support using Life Stress measures, instead of the specific Illness Stress measures used in this study. This study provides specific validation of this Main Effects Model with cancer patients with a spouse/partner.

The Stress Prevention Model indicates that Social Support has a significant effect in reducing Illness Stress, which, in turn, is positively related to Psychological Distress. In the Support Deterioration Model, both Illness Stress and Psychological Distress cause a deterioration in the Social Support perception. As predicted by Barrera (1986, 1989), these two models were

supported by measures of Perceived Social Support (conceptualized, in the present study, as satisfaction with different social support sources).

Distinction between the Stress Prevention and the Support Deterioration Models is only possible using longitudinal data. Further research should also include well-validated measures of different aspect of social support besides Perceived Support. Information about the relationship between these constructs and personality variables, such as appraisal and coping, might also help to better tailor psychosocial interventions to cancer patients. Finally, replication of these findings is needed using different samples such as patients with health issues other than cancer, from different cohorts, and with different marital status.

APPENDIX A

TABLES

Table 1

Underlying Stress-Buffering Causal Mechanisms of Social Support.

• Influencing the occurrence of stressful event.
• Promoting health-behaviors and making the individual less likely to develop health problems.
• Making it more likely, for those who have social support, to seek medical care before the problem becomes more serious.
• Protecting people with adequate support from harmful effects of stressful events.
• Influencing the appraisal of stressful events.
• Enhancing coping by providing coping mechanisms and access to information or by enhancing motivation to engage in adaptive behaviors.
• Enhancing the recipient's self-esteem, self-confidence and feelings of autonomy. This can also protect people from depression that would otherwise occur.
• Protecting people by altering their mood and keeping the emotional arousal within manageable limits.

Adapted from Wortman, 1984.

Table 2

Barrera's (1996) Models for Stress, Social Support (SS) and Distress.

	Model	Type of Relationship	SS Measures	Predicted Paths (Stress, SS, & Distress)	Example
1.	Effective support mobiliza-tion model (buffering model)	SS is positively related to Stress	Enacted SS (mainly); social embedded-ness	Stress → + →SS → → - → Distress Stress → + →Distress (Stress results in mobilization of SS)	Low income mothers who experience greater strains rely more on their neighbors
2.	Stress prevention model	SS is negatively correlated with Stress	Perceived SS (or mixed measures)	SS → - → Stress → → + →Distress (SS prevents the occurrence of stressful situations or reduces the perceived threat)	Supportive behaviors decrease role ambiguity and therefore decrease burnout in correctional officers
3.	Support deteriora-tion model	SS is negatively correlated with Stress	Perceived SS (or mixed measures)	Stress → - → SS → → - → Distress Stress → + → Distress (Stress deteriorates availability or effectiveness of SS)	Perceived strain in depressed patients leads to less perceived social support
4.	Support seeking/ triage model	Positive relationship between SS and Distress	Enacted SS (or mixed measures)	Stress → + → Distress → + → SS Stress → + → SS (Individuals with greater Distress seek/ receive more SS)	Recognition of greater symptomatology leads to solicitation of medical psychosocial services
5.	Additive model (main effect model)	SS is negatively correlated with Distress	Social embedded-ness	Stress → + → Distress SS → - → Distress (Changes in Stress and SS make independent contribution to changes in Distress)	Based on attachment theory: the absence of supportive ties is sufficient for the development of distress.
6.	Reciprocity model	SS is negatively correlated with Distress	Perceived SS (mainly); social embedded-ness; enacted SS	Stress → - → SS → → - → Distress SS → - → Stress → + → Distress (There is a reciprocal relation between Stress and SS)	

Table 3

Total Gender and Race Distribution of the Full HRS Wave 1 Study.

		Married Couples		Non-married Households		Total	
		n	%	n	%	n	%
Gender							
	Male	5125	49.90%	741	31.20%	5866	46.40%
	Female	5149	50.10%	1632	68.80%	6781	53.60%
Race							
	Caucasian	8022	78.00%	1394	58.70%	9416	74.40%
	African Am.	1328	12.90%	736	31.00%	2064	16.30%
	Hispanic	931	9.10%	243	10.20%	1174	9.30%
Total		10281	100.00%	2373	100.00%	12654	100.00%

Note: Details may not add to totals because of small amounts of missing data.

Adapted from Juster & Suzman, 1995.

Table 4

Race and Cancer Location of Male and Female Cancer Patients with Spouse/Partner.

	Males		Females		Total	
	n	%	n	%	n	%
Race						
Caucasian	144	82.76%	299	87.94%	443	86.19%
African American	23	13.22%	30	8.82%	53	10.31%
Native American	5	2.87%	6	1.76%	11	2.14%
Asian	0	0.00%	2	0.59%	2	0.39%
Hispanic	2	1.15%	3	0.88%	5	0.97%
Total	174	100.00%	340	100.00%	514	100.00%
Cancer site						
Oral	21	12.07%	11	3.24%	32	6.23%
Digestive	22	12.64%	29	8.53%	51	9.92%
respiratory	20	11.49%	11	3.24%	31	6.03%
bone	7	4.02%	2	0.59%	9	1.75%
skin	2	1.15%	1	0.29%	3	0.58%
breast	2	1.15%	118	34.71%	120	23.35%
female genital	0	0.00%	130	38.24%	130	25.29%
male genital	31	17.82%	0	0.00%	31	6.03%
urinary	29	16.67%	5	1.47%	34	6.61%
eye	0	0.00%	1	0.29%	1	0.19%
brain and nervous syst.	2	1.15%	2	0.59%	4	0.78%
endocrine	5	2.87%	13	3.82%	18	3.50%
lymphomas	9	5.17%	7	2.06%	16	3.11%
leukemias	1	0.57%	1	0.29%	2	0.39%
other	15	8.62%	8	2.35%	23	4.47%
Missing Data	8	4.60%	1	0.29%	9	1.75%
Total	174	100.00%	340	100.00%	514	100.00%

Table 5

Demographic Characteristics, Social Support, Illness Stress, and Psychological Distress of Male and Female Cancer Patients with Spouse/Partner.

	Males (n = 174)		Females (n = 340)		t-test value	Effect Size (eta)
	M	SD	M	SD		
Demographics						
Age (years)	59.95	5.77	54.44	5.54	10.52***	.42
Education (years)	12.17	3.12	12.24	2.47	.28	
Household size	2.64	1.05	2.74	1.00	1.11	
Social Support						
Satisfaction neighbors	4.44	.86	4.29	1.05	1.67	
Satisfaction friendships	4.51	.80	4.56	.76	.78	
Satisfaction marriage	4.78	.55	4.64	.90	2.29*	.18
Satisfaction family life	4.57	.76	4.60	.72	.37	
Enjoy time with spouse	4.11	.76	4.02	.78	1.27	
Illness Stress						
Poor Health						
Poor QoL	3.06	1.00	2.85	.82	2.40*	.11
Poor ADL	1.79	.55	1.73	.47	1.25	
# Health Conditions	1.43	1.22	1.21	1.12	2.07*	.09
Pain	.71	1.02	.73	1.08	.18	
# Days Sick Home	6.28	22.55	10.16	40.78	1.17	
Cancer						
Time Since Diagnosis (years)	6.33	7.74	9.79	9.02	5.52***	.19
Seen Doc Last Year (1 = yes, 0 = no)	.72	.45	6.34	.48	2.07*	.10
Survival Rate	63.34	24.89	63.83	23.43	.22	
Psychological Distress						
Depression: CES-D	3.55	.46	3.51	.48	.90	
Affect	3.47	.57	3.40	0.58	1.31	
Interpersonal	3.81	.41	3.78	0.45	.64	
Psychosomatic	3.44	.61	3.42	0.64	.33	
Emotional Health	2.59	1.19	2.55	1.13	.28	
Psychiatric Problems	.59	.77	.41	.93	1.91	

Note. Unless indicated, all variables are scored in the positive direction (higher score is more of the construct).

* p< .05; *** p < .001

Table 6

Respondent in Case of a Two-Person Household and Approximate Time of Completion.

	Core Survey Section	Time (min)	Answered by
A	Demographics	3	Both people in household
B	Physical Health and Functioning	15	Both people in household
D	Housing and Mobility	8	Financially knowledgeable respondent
E	Family Structure and Transfers	16	Female respondent
F	Current Job	18	Both people in household
G	Past Job	8	Respondent with no current job
H	Work History	5	Both people in household
J	Disability	20	Both people in household
K	Retirement Plans	8	Both people in household
L	Cognition and Expectations	11	Both people in household
M	Net Worth	7	Financially knowledgeable respondent
N	Income	11	Financially knowledgeable respondent
R	Insurance	8	Financially knowledgeable respondent
S	Widowhood	2	Both people in household

Adapted from Juster & Suzman, 1995.

Table 7

Variables Used in the Study and Location in the HRS Wave1 Survey.

Main Construct	Indicator	Question #
F1: Physical Health (Survey Section: Health Status)		
V1	Subjective appraisal of quality of life (*POORQOL*)	B1-2
V2	Activities of daily living (*POORADL*)	B4-5d
V3	Number of health conditions besides cancer (*N_HEACON*)	B6, B7, B15, B16, B22, B25
V4	Severity of usual and worst pain (*PAIN*)	B29-29b
V5	Number of days home sick (*N_HOMESC*)	B48
	Location of cancer (*SURVIVAL*)	B11
	Time since cancer diagnosis (*T_TIMEDX*)	B10
	Saw doctor last year (cancer) (*SAWDOC*)	B12
F2: Psychological Distress (Survey Section: Health Status)		
V6	Psychiatric Problems (*PSYPROBL*)	B23-B24b
V7-V9	CES-D Depression (*AFFECT*, *INTERPER*, *PSYCHOS*)	B44-B44m
	Self-rated emotional health (*EMPROB*)	B3
F3: Social Support (Survey Section: Family Structure and Transfers)		
V10	Satisfaction with neighborhood (*STFNEIGH*)	E133b
V11	Satisfaction with friendships (*STFFRIEN*)	E133e
V12	Satisfaction with marriage (*STFMARRI*)	E133f
V13	Satisfaction with family life (*STFAMILY*)	E133h
V14	Enjoyability of time spent with spouse (*TIMESPOU*)	E136

Table 8

Goodness-of-Fit Indices for the Final Measurement and Structural Models.

		Measurement Models			Structured Models *		
	Convention for Acceptable Fit	Psychological Distress	Social Support	Illness Stress (Poor Health) *	Stress Prevention (Figure 4)	Support Deterioration (Figure 5)	Support Seeking/Triage (Figure 6)
Yuan-Bentler AGLS Chi-Square							
Chi-Square value		8.14	6.58	2.00	103.78	96.7	96.7
Degrees of Freedom (df)		5	4	5	71	69	69
Associated p value	*p > .05*	.15	.16	.85	.0068	.016	.016
Chi-Square/df	*< 2 or 3*	1.63	1.64	.40	1.46	1.40	1.40
Corrected Comparative Fit Index (CCFI)	*> .90*	.96	.97	1.00	.90	.91	.91
McDonald Non-Centrality Index	*> .90*	1.00	1.00	1.00	.94	.95	.95
Root Mean Square Residual (RMSR)	*small*	.030	.020	55.48	105.92	85.50	85.50
Standardized Root Mean Square Residual	*< .05*	.076	.035	.048	.21	.15	.15
Root Mean Square Error of Approximation (RMSEA)	*< .08*	.04	.04	.00	.040	.038	.038
Goodness-of-fit Index (GFI)	*> .90*	.99	.99	.99	.93	.94	.94
Adjusted Goodness-of-fit Index	*> .90*	.96	.96	.99	.90	.90	.90

Note. All three find measurement models are single factor models with multiple indicators as discussed in text.
* High RMSR is due to a large standard deviation of the variable Number of Days Home Sick.

Table 9

Factor Analysis Loadings, Variance Explained and Standardized Alpha for Social Support Factor.

	Factor 1 Social Support
satisfaction neighbors	.55
satisfaction friendships	.59
satisfaction marriage	.72
satisfaction family life	.75
enjoy time with spouse	.66
Variance explained (%)	43.49
Standardized alpha	.67

Note. n = 514

Table 10

Factor Analysis Loadings, Variance Explained and Standardized Alpha for Illness Stress Factor.

	Factor 1	Factor 2
	Poor Health	Cancer
Poor QoL	.78	
Poor ADL	.86	
# Health Conditions	.73	
Pain	.71	
# Days Sick Home	.48	
Time since cancer diagnosis (times -1)		.84
saw doctor		.84
cancer survival rate		.43
Variance explained (%)	33.35	20.45
Standardized alpha	.77	.56

Note. n = 514; table only shows loadings > .35.

Table 11

Factor Analysis Loadings, Variance Explained and Standardized Alpha for Psychological Distress Factor.

	Factor 1
	Psychological Distress
Depression: CES-D (inverted)	
Psychosomatic	.83
Affect	.75
Interpersonal	.80
Emotional Health	.71
Psychiatric Problems	.64
Variance explained (%)	56.18
Standardized alpha	.78

Note. n = 514.

Table 12

Univariate Correlations between Illness Stress, Psychological Distress and Social Support Variables, for Cancer Patients with Spouse/Partner.

		Illness Stress					Psychological Distress					Social Support				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ILLNESS STRESS																
1	Poor Quality of Life	-														
2	Poor Activ. Daily Living	.60**	-													
3	No. Health Conditions	.45**	.55**	-												
4	Pain	.43**	.54**	.38**	-											
5	No. Days Home Sick	.23**	.33**	.25**	.22**	-										
PSYCHOLOGICAL DISTRESS																
6	Emotional Problems	.48**	.41**	.29**	.28**	.14**	-									
7	Psychiatric Problems	.18**	.21**	.15**	.28**	.17**	.33**	-								
8	Affect Depression	.32**	.29**	.20**	.28**	.08	.52**	.41**	-							
9	Interpersonal Depres.	.20**	.25**	.19**	.27**	.05	.36**	.40**	.53**	-						
10	Psychosomatic Depres.	.48**	.53**	.39**	.51**	.25**	.48**	.35**	.59**	.52**	-					
SOCIAL SUPPORT																
11	Satisfaction Neighbors	-.07	-.10	-.05	-.07	.00	-.19**	-.16**	-.16**	-.16**	-.13**	-				
12	Satisfaction Friends	-.20**	-.19**	-.12**	-.17**	-.09*	-.24**	-.15**	-.30**	-.24**	-.19**	.31**	-			
13	Satisfaction Marriage	-.09	-.06	-.09*	-.09*	-.10*	-.15**	-.13**	-.26**	-.23**	-.13**	.21**	.24**	-		
14	Satisfaction Family	-.15**	-.15**	-.05	-.12**	-.06	-.24**	-.19**	-.39**	-.29**	-.13**	.27**	.31**	.41**	-	
15	Time with Spouse	-.15**	-.11*	-.08	-.07	-.05	-.26**	-.13**	-.29**	-.21**	-.18**	.16**	.18**	.42**	.38**	-

* $p < .05$; ** $p < .01$; $n = 514$.

Table 13

Variances (off-Diagnonal) and Covariances (Diagonal, in Bold) between Illness Stress, Psychological Distress and Social Support Variables, for Cancer Patients with Spouse/Partner.

		Illness Stress					Psychological Distress					Social Support				
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
ILLNESS STRESS																
1	Poor Quality of Life	**.79**														
2	Poor Activ. Daily Living	.27	**.25**													
3	No. Health Conditions	.46	.32	**1.34**												
4	Pain	.41	.29	.46	**1.12**											
5	No. Days Home Sick	7.41	5.80	10.23	8.43	**1273.78**										
PSYCHOLOGICAL DISTRESS																
6	Emotional Problems	.50	.24	.39	.35	5.83	**1.32**									
7	Psychiatric Problems	.14	.09	.15	.27	5.36	.33	**.78**								
8	Affect Depression	.16	.08	.13	.17	1.65	.34	.21	**.33**							
9	Interpersonal Depres.	.08	.05	.09	.13	.78	.18	.15	.13	**.19**						
10	Psychosomatic Depres.	.27	.17	.28	.34	5.71	.35	.20	.22	.14	**.40**					
SOCIAL SUPPORT																
11	Satisfaction Neighbors	-.06	-.05	-.05	-.08	-.04	-.21	-.14	-.09	-.07	-.08	**.99**				
12	Satisfaction Friends	-.14	-.07	-.11	-.14	-2.41	-.21	-.10	-.13	-.08	-.09	.24	**.60**			
13	Satisfaction Marriage	-.06	-.02	-.08	-.07	-3.05	-.14	-.09	-.12	-.08	-.06	.16	.15	**.64**		
14	Satisfaction Family	-.10	-.05	-.04	-.10	-1.43	-.21	-.12	-.17	-.09	-.11	.20	.18	.24	**.53**	
15	Time with Spouse	-.10	-.04	-.07	-.06	-1.29	-.23	-.09	-.13	-.07	-.09	.12	.11	.26	.22	**.60**

Note. n = 514.

Table 14

Illness Stress and Psychological Distress (Depression) Means and Standard Deviations by level of Social Support.

	Social Support		
	Low	High	Total
Low Illness Stress			
n	24	59	83
m	1.37	1.21	1.26
SD	.31	.25	.28
Low-Medium Illness Stress			
n	26	42	68
m	1.33	1.24	1.28
SD	.25	.24	.25
Medium-High Illness Stress			
n	53	57	110
m	1.62	1.34	1.48
SD	.49	.29	.42
High Illness Stress			
n	52	37	89
m	2.02	1.65	1.87
SD	.72	.52	.67
All Levels of Illness Stress			
n	155	195	350
m	1.59	1.36	1.49
SD	.50	.40	.50

APPENDIX B

FIGURES

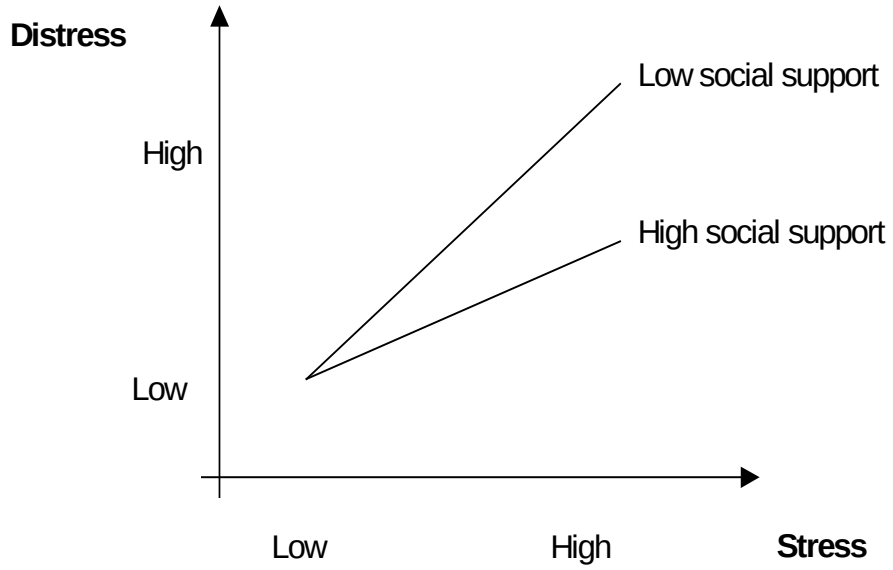

Figure 1. [1] Stress-buffering model.

[1] ADAPTED FROM Cohen, S., & Wills, T. A. (1985). Stress, social support and the buffering hypothesis. Psychological Bulletin, 98, 2, page 316.

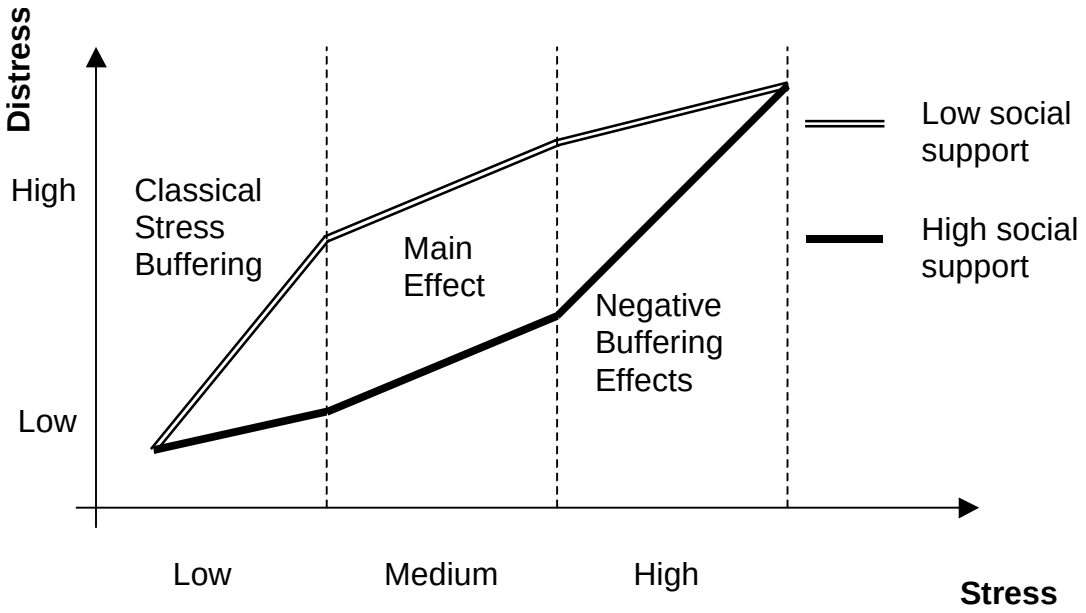

Figure 2. [2] Model of curvilinear stress buffering effects.

[2] ADAPTED FROM Barrera, M. (1989). Models for social support and life stress: Beyond the buffering hypothesis. In L. H. Cohen (Ed.). Life Events and Psychological Functioning: Theoretical and Methodological Issues. (p. 223). Newbury Park, CA: Sage Publications Inc.

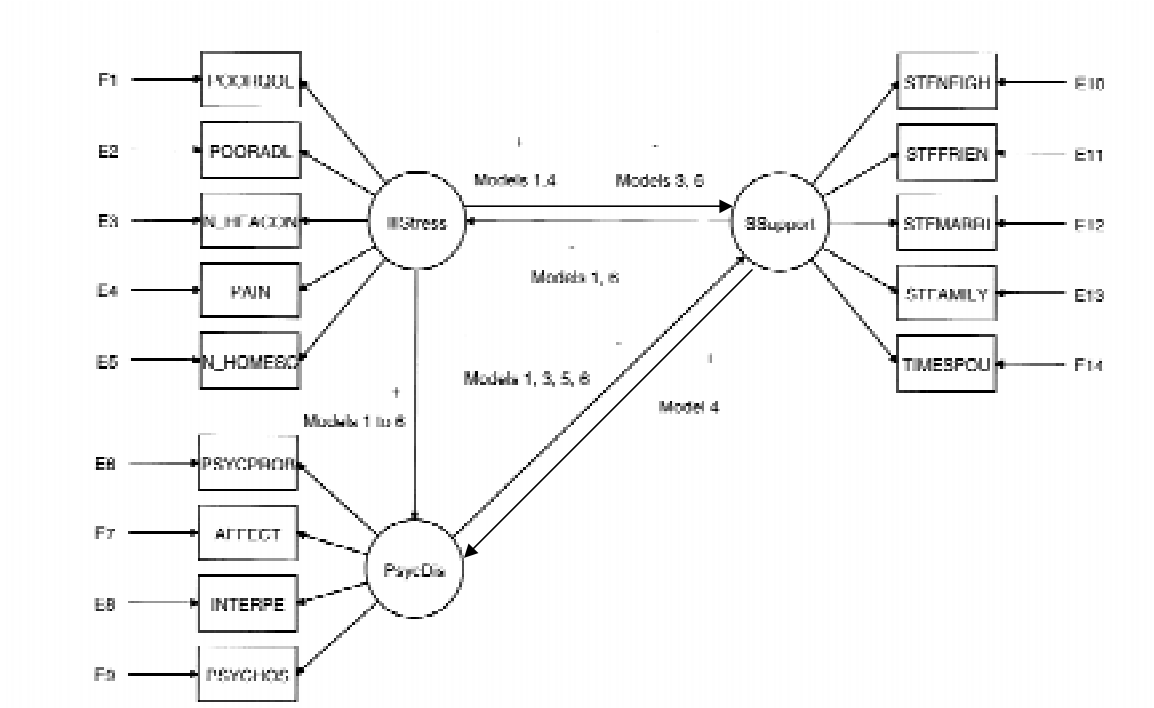

Figure 3. Models tested in the present study.

Note. E_1-E_{14} correspond to the variables V_1-V_{14} as described in Table 7.

Model 1: Effective support mobilization (buffering model) (Enhacted and Structural SS measures)
Model 2: Stress prevention (Perceived SS measures)
Model 3: Support deterioration (Perceived SS measures)
Model 4: Support seeking/triage (Enhacted SS measures - not measured)
Model 5: Additive (main effect model) (Structural SS measures)
Model 6: Reciprocity (Perceived and Structural SS measures)

SS = Social Support

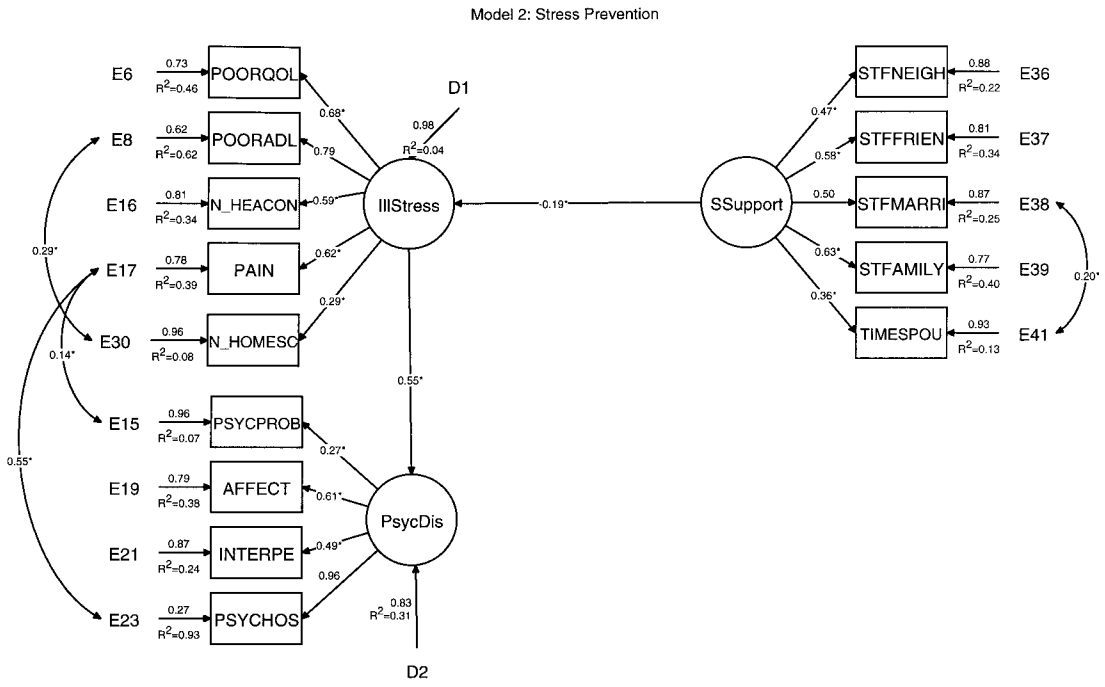

Figure 4. Final Stress Prevention Model (Model 2).

ILLSTRESS = Illness Stress	SSUPPORT = Social Support
POORQOL = Poor Quality of Life POORADL = Poor Activities of Daily Living N_HEACON = Number of Health conditions PAIN = Usual and worst pain N_HOMESC = Number of days home sick	STFNEIGH = Satisfaction with neighborhood STFFRIEND = Satisfaction with friends STFMARRI = Satisfaction with marriage STFAMILY = Satisfaction with family life TIMESPOU = Enjoyability of time spent with spouse
PSYCDIS = Psychological Distress	
PSYCPROBL = Psychiatric Problems AFFECT = Affect Depression (CES-D) INTERPER = Interpersonal Depression (CES-D) PSYCHOSO = Psychosomatic Depression (CES-D)	

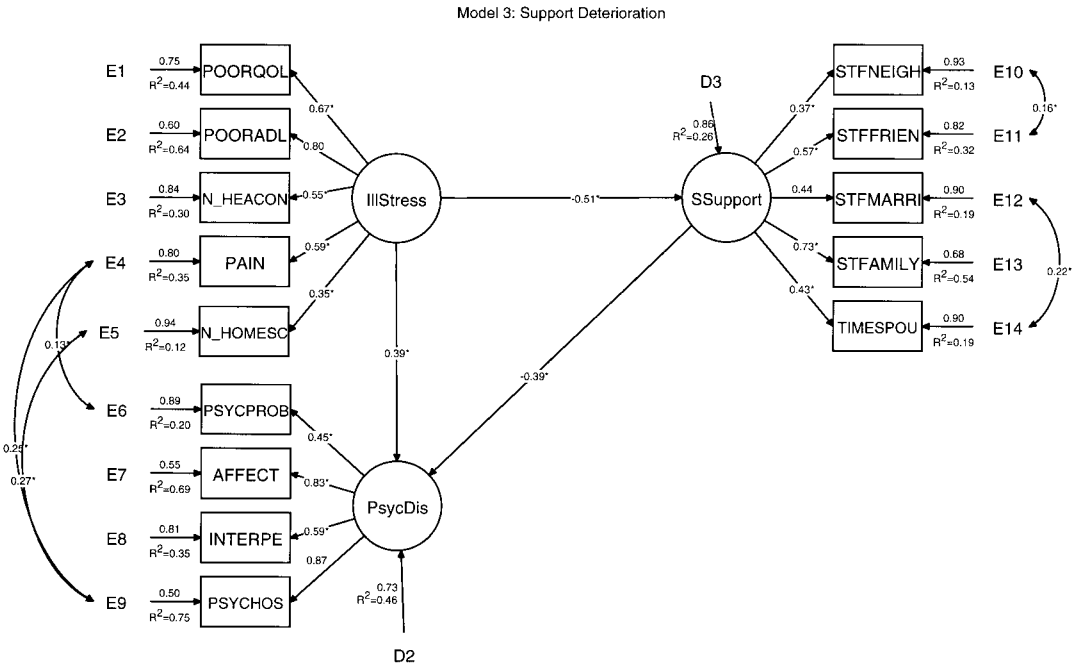

Figure 5. Final Support Deterioration Model (Model 3).

ILLSTRESS = Illness Stress	SSUPPORT = Social Support
POORQOL = Poor Quality of Life POORADL = Poor Activities of Daily Living N_HEACON = Number of Health conditions PAIN = Usual and worst pain N_HOMESC = Number of days home sick	STFNEIGH = Satisfaction with neighborhood STFFRIEND = Satisfaction with friends STFMARRI = Satisfaction with marriage STFAMILY = Satisfaction with family life TIMESPOU = Enjoyability of time spent with spouse
PSYCDIS = Psychological Distress	
PSYCPROBL = Psychiatric Problems AFFECT = Affect Depression (CES-D) INTERPER = Interpersonal Depression (CES-D) PSYCHOSO = Psychosomatic Depression (CES-D)	

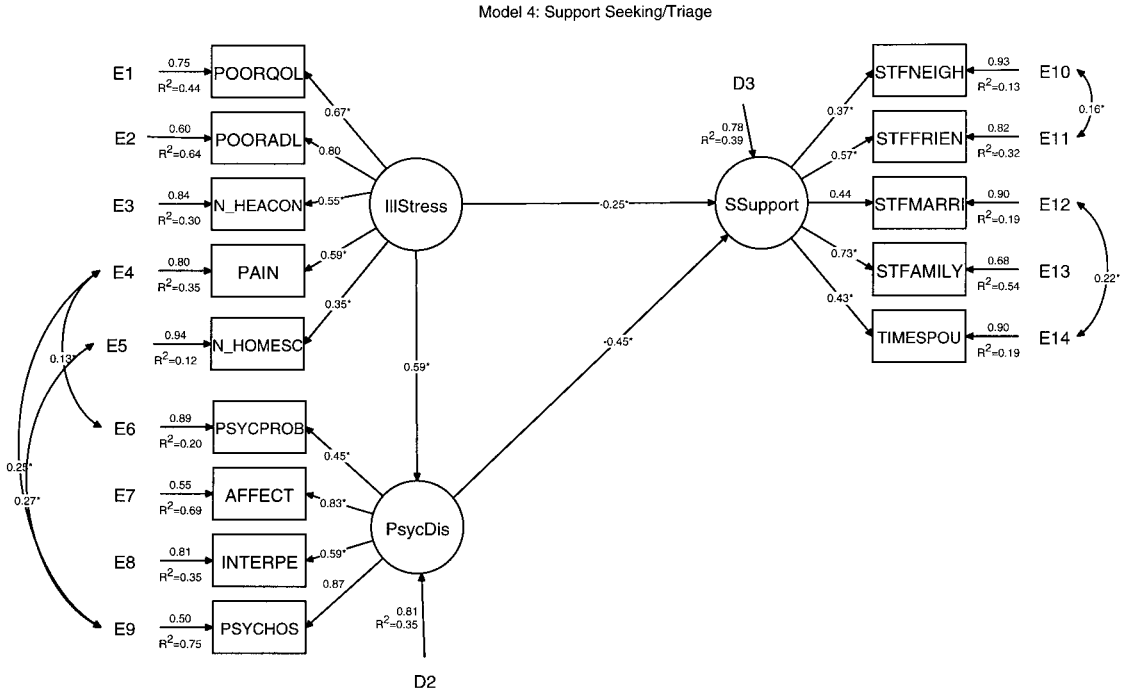

Figure 6. Final Support Seeking/Triage Model (Model 4).

ILLSTRESS = Illness Stress	SSUPPORT = Social Support
POORQOL = Poor Quality of Life POORADL = Poor Activities of Daily Living N_HEACON = Number of Health conditions PAIN = Usual and worst pain N_HOMESC = Number of days home sick	STFNEIGH = Satisfaction with neighborhood STFFRIEND = Satisfaction with friends STFMARRI = Satisfaction with marriage STFAMILY = Satisfaction with family life TIMESPOU = Enjoyability of time spent with spouse

PSYCDIS = Psychological Distress
PSYCPROBL = Psychiatric Problems AFFECT = Affect Depression (CES-D) INTERPER = Interpersonal Depression (CES-D) PSYCHOSO = Psychosomatic Depression (CES-D)

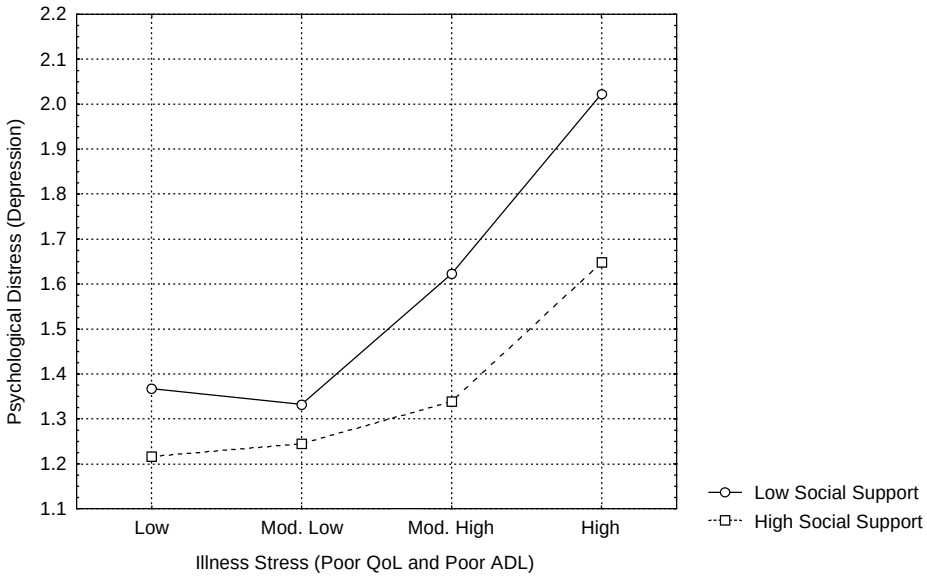

Figure 7. Psychological Distress (depression) by levels of Illness Stress and Social Support.

APPENDIX C

HRS WAVE 1 SURVEY:

QUESTIONS USED IN THE PRESENT STUDY

DEMOGRAPHIC BACKGROUND

A1. First, I have some questions about your background. In what month, day, and year were you born?

A3. What is the highest grade of school or year of college you completed?

A7. Do you consider yourself Hispanic or Latino?

A8. Do you consider yourself primarily white or Caucasian, Black or African American, American Indian, or Asian?

A10. Please remind me, are you currently married, living with a partner, separated, divorced, widowed or never have been married?

PHYSICAL HEALTH AND FUNCTIONING

B1. Next I have some questions about your health. Would you say your health is excellent, very good, good, fair, or poor?

B2. Compared to 1 year ago, would you say that your health is much better now, somewhat better now, about the same, somewhat worse, or much worse than it was then?

B3. What about your emotional health – how good you feel now or how stressed, anxious, or depressed you feel? Is it excellent, very good, good, fair, or poor?

B4. We are interested in how much difficulty people have with various activities because of a health or physical problem. Please look at the answer categories at the top of the page one of the booklet and let me know how difficult each activity is for you. Exclude any difficulties that you expect to last less than three months. How difficult is it for you to … (not at all difficult, a little difficult, somewhat difficult, very difficult/can't do, don't do)

B4a. … run or jog about a mile? (Is this not at all difficult, a little difficult, somewhat difficult, very difficult, or something you can't do at all?)

B4b. … walk several blocks?

B4c. … walk one block?

B4d. …walk across a room?

B4e. …sit for about 2 hours?

B4f. …get up from a chair after sitting for long periods?

B4g. …get up in and out of bed without help?

B4h. How difficult it is for you to climb several flights of stairs without resting?

B4j. …climb on flight of stairs without resting?

B4k. …lift or carry weights over 10 pounds, like a heavy bag of groceries?

B4m. How difficult is it for you to stoop, kneel, or crouch?

B4n. …pick up a dime from a table?

B4p. …Bathe or shower without help?

B4p. …reach or extend your arms above shoulder level?

B4r. …pull or push large objects like a living room chair?

B4s. …eat without help?

B4t. …dress without help?

B5. Here are some other activities that people may have difficulty with. How difficult is it for you… ((not at all difficult, a little difficult, somewhat difficult, very difficult/can't do, don't do)

B5a. …use a map to figure out how to get around in a strange place?

B5b. …use a microwave oven after reading the instructions?

B5c. …use a calculator to help balance your checkbook?

B5d. …use a computer or wordprocessor?

B6. Now, not using the booklet, has the doctor ever told you that you have high blood pressure or hypertension?

B7. (Has the doctor ever told you that you have) Diabetes or high blood sugar?

B10. (Has the doctor ever told you that you have) Cancer or a malignant tomor of any kind except skin cancer?

B11. In what year was tour (most recent/next most recent) cancer diagnosis?

B12. During the last 12 months, have you seen a doctor about this cancer?

B15. Not including asthma, has a doctor ever told you that you have chronic lung disease such as chronic bronchitis or emphysema?

B16. (Has the doctor ever told you that you had) A heart attack, coronary heart disease, angina, congestive heart failure, or other heart problem?

B22. Has the doctor ever told you that you had a stroke?

B23. (Has the doctor ever told you that you had) Emotional, nervous, or psychiatric problems?

B24. During the last 12 months, have you had any emotional, nervous, or psychiatric problems?

B24a. Do you now get psychiatric or psychological treatment for your problems?

B24b. Do you now use tranquilizers, antidepressants, or pills for nerves?

B25. Have you ever had, or has a doctor ever told you that you have, arthritis or rheumatism?

B29. Are you often in trouble with pain?

B29a. When the pain is at its worst, is it mild, moderate, or severe?

B29b. How bad is the pain most of the time: mild, moderate, or severe?

B44. Please look at the top of page 2 of the booklet and tell me how often you have experience the following feelings during the past week – all or almost all of the time, most of the time, some of the time, or none or almost none of the time.

B44a. During the past week, I felt depressed. (all or almost all of the time, most of the time, some of the time, or none or almost none of the time?)

B44b. I felt that everything I did was an effort.

B44c. My sleep was restless.

B44d. (During the past week) I was happy.

B44e. I felt lonely.

B44f. I felt people were unfriendly.

B44g. I enjoyed life.

B44h. (During the past week) I felt sad.

B44j. I felt that people dislike me.

B44k. I could not “get going.”

B44m. I did not feel like eating; my appetite was poor.

B48. (Aside from any hospital or nursing home stays) How many days did you stay in bed more than half of the day because of illness or injury during the last 12 months?

FAMILY STRUCTURE AND TRANSFERS

E133. Now, looking at the bottom of page 3 of the booklet, please tell how satisfied or dissatisfied are you with various aspects of your like at the current time. Are you very satisfied, somewhat satisfied, about evenly satisfied and dissatisfied, somewhat dissatisfied, or very dissatisfied…

E133b. …with your neighboorhood where you live?

E133e ….with your friendships?

E133f. [IF MARRIED:] …with your marriage?

E133h. …with your family life?

E136. Generally speaking, would you say that the time you spend together with your (husband/wife/partner) is extremely enjoyable, very enjoyable, somewhat enjoyable, or not too enjoyable?

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